SHOUT
SHARE
IT

Bibliothèque botanique
ÉMILE BURNAT

Catalogue N°

Provient de

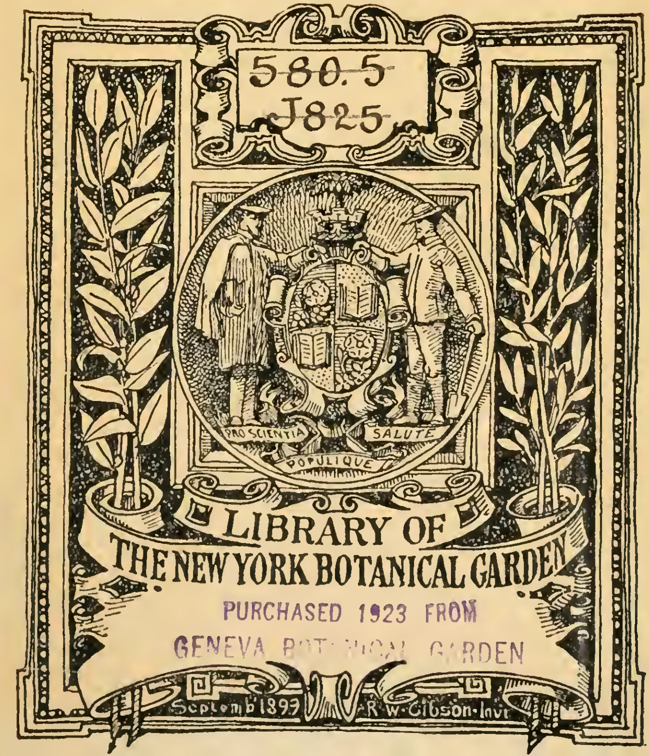
Livres provenant de la bibliothèque botanique d'**Emile Burnat** (1828-1920), insérés en octobre 1920 dans la bibliothèque du Conservatoire botanique de

Ge

Bu

DU C

XJ .0856 v.52


PRO SCIENTIA
SALUTE
POPULIQUE
Septemb 1899
R. W. Gibson. Inv.

~~580.5~~
~~J825~~
LIBRARY OF
THE NEW YORK BOTANICAL GARDEN
PURCHASED 1923 FROM
GENEVA BOTANICAL GARDEN

THE

JOURNAL OF BOTANY

BRITISH AND FOREIGN.

EDITED BY

JAMES BRITTEN, K.S.G., F.L.S.

LATE SENIOR ASSISTANT, DEPARTMENT OF BOTANY, BRITISH MUSEUM.

LIBRARY
NEW YORK
BOTANICAL
GARDEN

VOL. LII.

WITH PLATES AND TEXT ILLUSTRATIONS

LONDON
WEST, NEWMAN & CO., 54, HATTON GARDEN.
1914.

.O856
V. 52

LONDON:

PRINTED BY WEST, NEWMAN AND CO.,

HATTON GARDEN, E.C.

CONTRIBUTORS

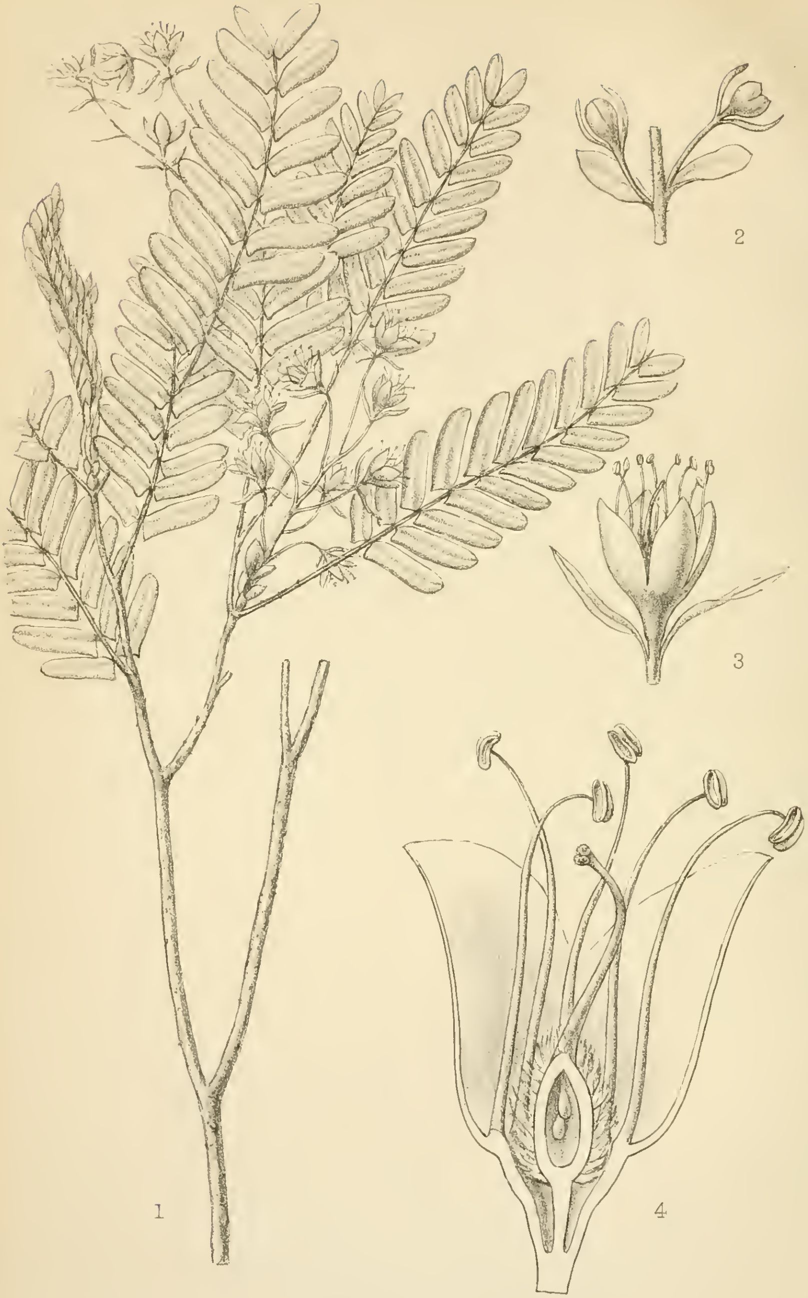
TO THE PRESENT VOLUME.

E. G. Baker, F.L.S.
J. G. Baker, F.L.S.
W. Barclay.
E. J. Bedford.
Arthur Bennett, A.L.S.
Spencer H. Bickham, F.L.S.
V. H. Blackman, F.R.S.
Sidney F. Blake, A.M.
G. S. Boulger, F.L.S.
James Britten, F.L.S.
W. H. Burrell, F.L.S.
F. Cavers, D.Sc., F.L.S.
F. J. Chittenden, F.L.S.
Miller Christy, F.L.S.
J. E. Cooper.
A. D. Cotton, F.L.S.
H. N. Dixon, M.A., F.L.S.
R. A. Dümmer.
J. B. Farmer, F.R.S.
W. Fawcett, B.Sc., F.L.S.
Antony Gepp, M.A., F.L.S.
Col. M. J. Godfery.
G. Goode, M.A.
F. J. Hanbury, F.L.S.
J. W. Hartley.
W. P. Hiern, M.A., F.R.S.
E. M. Holmes, F.L.S.
A. Bruce Jackson.
B. Daydon Jackson, Ph.D., Sec. L.S.
C. E. Larter, F.L.S.
G. Lister, F.L.S.
A. S. Marsh, B.A.
E. S. Marshall, M.A., F.L.S.
Arthur Mayfield.
J. Cosmo Melvill, D.Sc., F.L.S.
A. H. Moore.
Spencer le M. Moore, F.L.S.
C. E. Moss, D.Sc., F.L.S.
Seiitchi Narita.
W. E. Nicholson.
R. Paulson, F.L.S.
S. R. Price.
H. W. Pugsley, B.A.
J. Ramsbottom, B.A., F.L.S.
J. K. Ramsbottom.
Clement Reid, F.R.S.
E. M. Reid, D.Sc., F.L.S.
A. B. Rendle, D.Sc., F.R.S.
H. J. Riddelsdell, M.A.
H. N. Ridley, C.M.G., F.R.S.
W. D. Roebuck, F.L.S.
W. Moyle Rogers, F.L.S.
C. E. Salmon, F.L.S.
A. Lorrain Smith, F.L.S.
F. Stratton, F.L.S.
E. N. Thomas, D.Sc.
H. H. Thomas.
H. S. Thompson, F.L.S.
W. G. Travis.
T. Wainwright.
H. F. Wernham, D.Sc. F.L.S.
G. S. West, D.Sc., F.L.S.
J. A. Wheldon, F.L.S.
J. W. White, F.L.S.
F. N. Williams, F.L.S.
W. Wilson.
F. G. Wiltshear.
E. A. Woodruffe-Peacock, F.L.S.
Major A. H. Wolley-Dod.

Directions to Binder.

TAB. 529	to face page	1
,, 530	,,	89
,, 531	,,	113
,, 532	,,	193
,, 533	,,	225
,, 534	,	257
PORTRAIT OF WILLIAM WEST	,	161

The Supplement ('A Flora of Gibraltar and the Neighbourhood') should be placed separately at the end of the volume.



P. Highley del. et lith. West, Newman imp.

Talbotiella eketensis *Bak. fil.*

LIBRARY
NEW YORK
BOTANICAL
GARDEN

THE

JOURNAL OF BOTANY

BRITISH AND FOREIGN.

PLANTS FROM THE EKET DISTRICT, S. NIGERIA

COLLECTED BY MR. AND MRS. P. AMAURY TALBOT.

(PLATE 529.)

MR. AND MRS. P. AMAURY TALBOT have been continuing their work of botanical exploration in Southern Nigeria. For the last twelve months Mr. Talbot has been stationed in the Eket District, a broad strip of land bordering the Gulf of Guinea, stretching westward from Calabar and the Cross River. Mr. Talbot describes the land bordering the shore of the Gulf as one vast littoral, crossed and recrossed by a network of waterways, so that it is possible to pass by canoe from French Dahomey on the one side to the German Cameroons on the other without once sighting the sea. The country is drained by the inner stretches of the Cross River and the Kwa Ibo. It consists of mangrove marsh lining the banks of creek and stream, and of fertile palm swamp with coco-nut, piassava, and oil-palms, while toward the seashore dwarf dates fringe the low-lying lands.

Unfortunately, owing to the unsettled nature of the country, botanical exploration has been carried on with some difficulty, but notwithstanding this, a large collection has been sent to the National Herbarium, where it is in course of determination. Many specimens are identical with those previously sent by the Talbots from the high-lying Oban District, but the collection contains a good proportion of West African species not yet recorded from Nigeria, though generally previously known from the Cameroons. An interesting feature is the presence of species hitherto known only from material collected by Gustav Mann at Calabar. There are also a good number of novelties, and it is proposed to publish descriptions of these, and notes on other species of interest, in the pages of this Journal. The present instalment includes a new genus of Leguminosæ and a number of new species, especially of the families Rubiaceæ and Apocynaceæ. Mrs. Talbot has paid special attention to the Napoleonas, and the collection will supply a substantial addition to the number of species hitherto known from West Tropical Africa. The notes as to habit, &c., have been kindly supplied by Mrs. Talbot.

A. B. RENDLE.

AUG 7 - 1923

POLYPETALÆ. By E. G. Baker, F.L.S.

Anonaceæ.

Isolona campanulata Engler & Diels, No. 3261.—An interesting Cameroons species, not previously collected in South Nigeria. Sepals bright green petals, centre blackish purple. Eket-Ibeno Road.

Bixineæ.

Oncoba Mannii Oliver.—This seems to be rather common in Southern Nigeria and also at Bipinde in the Cameroons. Zenker, Nos. 1637–2860–2333 distributed as *O. aristata* Oliver, belong here.

Leguminosæ.

Talbotiella, Baker fil., nov. gen.

Receptaculum breviter infundibuliforme. *Sepala* 4, suborbicularia, æstivatione late imbricata, inter se fere æqualia. *Petala* 0. *Stamina* 8–10 inter se parum inæqualia, filamentis filiformibus inter se liberis, antheris versatilibus, longitudinaliter dehiscentibus. *Ovarium* stipitatum, villosum, 2-ovulatum, stipite receptaculo adnata, stylo terminali elongato, sursum glabro, stigmate parvo, capitellato. *Legumen* ignotum.

Frutex foliis paripinnatis foliolis multis oppositis. *Racemi* axillares, laxe pluri vel multiflori. *Bracteolæ* 2, submembranaceæ, lineari-oblongæ, haud involucrem formantes, apicem versus pedicellorum positæ. *Squamæ* ad basin pedunculorum scariosæ, brunnescentes, imbricatæ, cymbiformes, dorso nitidæ.

T. eketensis, sp. nov. (Pl. 529). — *Ramuli* lignosi cortice nigrescente obtecti; *stipulis* angustis; *foliis* multifoliolatis, *foliolis* oppositis 12–16 jugis oblongis sessilibus, obliquis (margine postico basi in triangulum acutum brevissimum protracto) apice rotundatis, superne glabris, subtus breviter pubescentibus, costa subcentrali, rhachide tenui superne canaliculata; *floribus* in racemos pluri vel multiflores et laxos dispositis, *pedicellis* gracilibus pubescentibus, *bracteolis* lineari-oblongis, *sepalis* ad basin fissis membranaceis concavis: *receptaculo* extus pilis sparsis obtecto; *petalis* nullis; *staminibus* 8–10 filamentis filiformibus calyce longioribus; *ovario* stipitato villoso, *stylo* tenui, stigmate parvo; *fructu* ignoto.

Ibeno, at estuary of Kwa Ibo River, No. 3188. Bush 1–6 metres. Leaves 5–8 cm. long, leaflets 7–13 mm. long, 3–4·5 mm. broad. Bracteoles ± 8 mm. long. Calyx 4–5 mm. long. Receptacle ± 2 mm. long. Ovary 2·5 mm. long.

This genus belongs to the tribe Cynometreæ of the Cæsalpineæ, and is allied to *Cynometra*, especially to such species as *C. Hankei* Harms.

The genus *Cynometra*, as defined in Bentham & Hooker's Gen. Plant., consists of trees or shrubs, with paripinnate leaves in one or few pairs, five petals, and an arcuate-ovoid or subreniform, rarely straight, thick, turgid, rarely subcompressed pod. It therefore seems undesirable to place in *Cynometra* plants possessing the structure of *Talbotiella.*

T. eketensis is very closely allied to the plant described by Dr. Harms (in Engl. Jahrb. xxvi. 267) as *Cryptosepalum ? Staudtii.* Unfortunately good flowers were not present when his species was described, and the number of the stamens is doubtfully considered to be 2–3. *Talbotiella* is quite different in structure from *Cryptosepalum*; in this latter genus the calyx, as the name implies, is minute, there is one posterior petal, three stamens, and the ovary is 2–4-ovulate.

Mrs. Talbot's notes are as follows:—Bushes growing in profusion in rather loose drift sand. Highest growth 4–6 metres. Dwarfy shrubs flower at 1 metre. New leaves very pale green shaded mauvy pink, older leaves dark glossy green. Flowers all white; stamens and anthers brightest orange; petiole white at top, palest green below. Bracts bright pink.

Rosaceæ.

Strephonema Mannii Hook. fil. Agrees with Mann, No. 2293 in Hb. Kew, from Old Calabar and Gaboon rivers.

The position of the genus *Strephonema* is a matter of some uncertainty. Bentham & Hooker in their *Genera Plantarum* place it in Lythraceæ, from which Koehne * excludes it in his Monograph of the order. Baillon has suggested that it is an abnormal Rosaceous plant. The ovary is partly adherent to the tube of the calyx, and there are two pendulous collateral ovules. Mr. Spencer Moore and I, who have both dissected flowers independently, came to the same conclusion, and incline to agree with Baillon's suggestion, and consider that the structure indicates considerable affinity with such genera as *Pygeum* in the Pruneæ tribe of Rosaceæ.

Rhizophoreæ.

Cassipourea eketensis Baker fil., sp. nov. *Ramuli* graciles teretes glabri; *foliis* inter minores generis oppositis ovatis basi cuneatis breviter petiolatis subcoriaceis glabris apice acuminatis apice ipso obtusis nervis lateralibus utrinque 5–7 ante marginem arcuatis inter sese conjungentibus costa subtus prominente; *stipulis* caducis; *floribus* axillaribus glomeratis; *pedicellis* calyce brevioribus; *calyce* campanulato usque ad medium 5-lobato lobis triangularibus acutis erectis valvatis; *petalis* unguiculatis apice fimbriato-laceratis; *staminibus* calyce duplo longioribus antheris subglobosis; *stylo* tereti stigmate dilatato; *ovario* triloculari ovulis in loculis 2 axi collateraliter affixis.

Sine numero.

Leaves ovate, acuminate, the actual apex being obtuse, 5·6 cm. long, 16–27 mm. broad, petiole 1–2 mm. long. *Calyx* ± 5 mm. long. *Petals* fimbriate-lacerate, ± 9 mm. long. *Stamens* nearly twice as long as the calyx. *Disc* cupuliform. *Ovary* trilocular, hairy.

---

* See also Sitzungsbericht Bot. Verein. Prov. Brand. xxii. 66.

Allied to *Weihea Afzelii* Oliver, but this plant has smaller leaves and more numerous flowers.

No. 3234 is closely allied but the leaves are longer.

PASSIFLOREÆ.

Soyauxia Talbotii Baker fil., sp. nov. Frutex 5–6 metr. (Mrs. Talbot). *Ramuli* sursum parce strigoso-pilosi deorsum fere glabri; *stipulis* mox deciduis; *foliis* subcoriaceis petiolo brevi instructis oblongis basi acutis apice acuminatis nervis lateralibus circ. 12–13 patentibus inter sese per venas tenues laxe reticulatas conjunctis; *inflorescentiis* axillaribus laxiuscule racemosis rhachide fulvo-tomentosa; *floribus* breviter pedicellatis; *bracteis* parvis; *calycis* segmentis ovatis extus ferrugineo-tomentosis; *petalis* obovatis obtusis sepala æquantibus; *filamentis* filiformibus petalis longioribus; *disco* tubiformi brevi; *ovario* piloso; *stylis* filiformibus subulatis sepala superantibus.

Ikotobo Road. No. 3254.

Leaves 14–16·5 cm. long, 45–48 mm. broad, lateral nerves 10–20 mm. apart. *Petiole* ± 3 mm. long. *Racemes* 6·0–10·0 cm. long. *Pedicels* ± 1 mm. long. *Sepals* 3·5–4·0 mm. long. *Styles* ± 7 mm. long.

Very closely allied to *S. bipindensis* Gilg., but the flowers are slightly larger and the lateral nerves of the leaves are more distant.

Flower white, with dark very small anthers.

GAMOPETALÆ. By SPENCER MOORE & H. F. WERNHAM.

RUBIACEÆ.

Urophyllum eketense Wernham, sp. nov. Frutex erectus, ramulis novellis valde compressis viridibus, tardius glabrescentibus subteretibus cortice lævi brunneo; *foliis* magis pergamaceis obovato-oblongis vix acuminatis, utrinque nisi subtus in venis obscure puberulis glabris supra nitentibus, venis conspicuis supra impressis subtus prominentibus, basin versus in petiolum minute puberulum breviusculum leniter angustatis, *stipulis* ovatis majusculis viridissimis appresse puberulis; *floribus* in cymis axillaribus nec quasi-terminalibus paniculatis minute puberulis multifloris laxiusculis pedunculatis, *bracteis* linearibus subfiliformibus; *calyce* subintegro; *bacca* pisiformi glaberrimo, 4-loculari.

Oron-Eket main road. No. 3327.

The *leaves* average from 18 cm. × 6 cm. to over 21 cm. × 8 cm.; with stalk from 2–3 cm. long; lateral nerves, about 20 on each side of the midrib. *Stipules*, 1·5 cm. × 8 mm. Fruiting *peduncles*, 2–2·5 cm. long.

This species has evident affinities with the Central African *U. viridiflorum* Schweinf., but it is distinct in the shape of its leaves and their longer stalks, and in the wholly axillary inflorescence.

Tarenna eketensis Wernham, sp. nov. Arbor ca. 30-pedalis, ramulis divaricatis, novellis strigillosis; *foliis* chartaceis ellipticis utrinque angustatis breviter acuminatis obtusis, venis secundariis subtus prominentibus appresse sericeo-pubescentibus, reticulo tertiario conspicuo plus minus impresso, petiolo brevi tamen manifesto, *stipulis* ovato-triangularibus glaberrimis apice rotundatis; *inflorescentia* laxiuscula, ramulis qua pedicelli et ovaria densiuscule appresse pubescentibus demum glabrescentibus, *bracteis* foliaribus vel parvis; *calycis* dentibus brevibus acutis; *corollæ* tubo extus strigilloso, lobis glabris oblongis obtusis tubi dimidium excedentibus.

Main road from Oron to Eket, mostly in farm-clearings. No. 3024.

Near *T. nitidula* Hiern, differing especially in the thicker leaves with their distinctive venation, the obtuse stipules, the pubescent corolla, &c. The *leaves* attain about 12 cm. × 5 cm., with stalk barely 8 mm. long; there are 6–7 secondary nerves on either side of the midrib. *Stipules*, about 7 mm. × 4 mm. at most. Primary lateral *peduncles*, 3–4·5 cm. long; *thyrsus* about 4 cm. long and 6 cm. across. *Pedicels*, 4–5 mm. long. *Corolla*-tube 4·5 mm., lobes 3 mm. Anthers 4 mm. long; *style* exserted over 5 mm.

The ultimate inflorescence-branches, pedicels, ovaries, and calyces are densely clothed with a minute but conspicuous golden-brown silky pubescence, and the youngest branchlets are more or less sparsely strigose, as well as the leaf-veins on the under surface; otherwise the plant is glabrous, with shining leaves.

"Calyx-lobes pinkish; corolla-lobes greenish-white; stamens cream; pistil white."

Gardenia Cunliffeæ Wernham, sp. nov. Frutex scandens glaber, in siccitate omnino nigricans, ramulis novellis brevissimis, tardius cortice brunneo rugosulo indutis; *foliis* glabris obovato-oblongis apice rotundato, petiolatis, *stipulis* parvis ovato-lanceolatis acutis caducis; florum fragrantissimorum *cymis* sessilibus sæpius 3-floris glaberrimis, pedicellis breviusculis, in ovarium et *calycem* limbo dentibus brevibus 5 acutissimis deciduis insensim dilatatis; *corollæ* tubi parte brevi inferiore anguste tubulari dilute viride insuper subito late infundibulariter dilatato, lobis candidis purpureo-maculatis late oblongis apice rotundato.

Ubium River. No. 3149. A plant preserved in the Kew Herbarium, collected in Lagos by *Millen* (No. 144), is referable to the same species.

The leaves attain a size of over 13 cm. × 7 cm., with petiole over 2 cm. long; there are 4–5 pairs of secondary veins; *stipules* 8 mm. × 5 mm. *Pedicels* 5 mm. or longer. *Calyx* and *ovary* 3 mm. Lower, tubular part of corolla projects about 5 mm. beyond the calyx; the upper, funnel-shaped part of corolla-tube measures 2·5 cm. in length, and 3·5 cm. wide at the mouth; *corolla*-lobes 1·7 cm. × 1·4 cm.

The nearest affinity seems to be *G. Annæ* E. P. Wright, but this is readily distinguished by the shape of the leaves alone.

"Corolla-tube very pale-green externally, dark green inside toward the base; lobes white above, with vivid purple splashes.

Stamens cream. Stigma yellow, with cream tip. Fruit like a small plum, vivid orange" (Mrs. Talbot).

Named after Mrs. Cunliffe in recognition of her keen and practical interest in the Nigerian flora.

Randia Galtonii Wernham, sp. nov. Frutex ramulis teretibus viridibus molliter et densiuscule pubescentibus; *foliis* membranaceis 3-natis oblanceolatis basi cuneatis longiuscule sæpius caudato-acuminatis acutissimis, petiolo brevissimo, utrinque præcipue subtus et in venis inconspicuis hispidulo-pubescentibus, *stipulis* lato a basi in setis 2 productis; *floribus* in axillis solitariis 7–8-meris sessilibus magnis, *calycis* omnino hispiduli lobis setaceo-subulatis elongatis, *corollæ* extus pubescentis tubo gracili desuper glabrescente, insuper sub lobos oblongos caudato-acuminatos infundibuliformiter ampliato.

Oron-Eket main road; fl. Feb. No. 3219.

A striking species, allied to *R. octomera* Bth. & Hk. f., from which it differs in the more lengthily acuminate and more hairy leaves, and the much larger and differently-shaped corolla-lobes. The leaves are in whorls of 3; those at the ends of the shoots are small, and very unequal, two being subequal 9–10 cm. × 2·5–3 cm., and the third about 5 cm. × 1·5 cm. The adult leaves are subequal, 10–15 cm. long (exclusive of the almost setaceous acumen often over 2 cm. long) × 4·5 cm. wide above the middle; secondary veins 5–8 pairs; the petiole is at most barely 5 mm.; the lower, entire, part of the *stipules* is 8 mm. wide and 3–4 mm. deep, and the two setæ above reach 1 cm. in length. *Calyx*-tube and ovary together 2 cm. long, calyx-lobes 3–4·5 cm. *Corolla*-tube—the slender tubular part—14 cm. long, the funnel-shaped upper part about 3 cm. deep, and 4–4·5 cm. wide at the mouth; corolla-lobes 7–8 cm. × 1–1·5 cm. *Anthers* 2 cm. long. *Stigma* exserted 2·5 cm.

The species is named after Major Galton, of Hadzor, Droitwich, whose interest in the Nigerian flora has led him to attempt the introduction of Nigerian trees and shrubs on his English estate.

"Calyx very dark green; corolla-tube bright green, lobes white within and divided on the back longitudinally into a bright green half and a creamish-white half; stamens light drab; style and stigma cream" (Mrs. Talbot).

Randia Cunliffeæ Wernham, sp. nov. Frutex humilis ample patulus, ramulis hispidulo-pubescentibus; *foliis* glauco-griseis (Mrs. Talbot) tenuiter chartaceis 3-natis ellipticis v. oblanceolatis breviter nec caudate acuminatis acutis, brevissime petiolatis, utrinque hispidulis, *stipulis* a basi latiusculo triangulari 2–3-setaceo-acuminatis; *floribus* in axillis solitariis 8- vel pleio-meris sessilibus magnis; *calycis* hispiduli lobis plano-subulatis rigidiusculis vix setaceis; *corollæ* extus sparsiuscule asperulo-pubescentis tubo validiusculo, insuper parum ampliato, lobis oblanceolatis breviter cuspidato-acuminatis.

Oron-Eket main road. No. 3385.

Allied to the preceding species, but readily distinguished by the habit, the shape and colouring of the leaves, flat calyx-lobes, and by the shape of the corolla, with its rather broad tube, but little widened above.

The *leaves*, including the ultimate ones, are all subequal (cf. *R. Galtonii*), about 12 cm. × 4 cm., petiole not more than 7–8 mm. *Calyx*-lobes 3–4 cm. long, and as much as 2–3 mm. broad. *Corolla*-tube over 14 cm. long, 6–7 mm. wide at the middle when dry, and less than 2 cm. wide at the mouth; lobes 3·5 cm. × 9 mm.

Canthium viridissimum Wernham, sp. nov. Ramis subteretibus senioribus cortice sæpius fusco-brunneo conspicue lenticellato indutis, novellis brevibus glabris flavis complanatis; *foliis* membranaceis glaberrimis in siccitate viridissimis ellipticis utrinque breviter acuminatis, petiolo brevi, *stipulis* acutis minutiusculis; *inflorescentia* sessili, in juventute compacta tandem latiuscula foliis tamen multo breviore, *floribus* glabris pro genere mediocribus, alabastro obtuso pedicellis viridis gracilibus flores multo excedentibus; *calyce* infundibulari subintegro; *corollæ* tubo subglobose inflato.

Oron-Eket road, near Ikotobo. No. 3121, and other unnumbered specimens.

Readily distinguished by the very thin leaves, 8–9 cm. × 3·5–4 cm., and the short, light yellow young shoots. The straight flowering-branches bear flower-clusters not exceeding 3–4 cm. in diameter at each node. Floral pedicels 7 mm. long. The calyx is 2 mm. deep, and the corolla-tube is exserted 3 mm. beyond it, being 4 mm. wide; corolla-lobes 3 mm. long.

"Calyx-lobes bright green; corolla-lobes bright green, white toward the centre of the flower. Anthers orange-brown. Stigma bright orange with dark green centre-spot" (Mrs. Talbot).

Cuviera calycosa Wernham, sp. nov. Arbor 90-pedalis, glabra, in siccitate nigricans, ramulis tenuibus mox cortice cinereo indutis; *foliis* pergamaceis ellipticis v. oblongis pro genere parvulis, breviter et anguste acuminatis, obtusis, basi acutis, glabris, petiolo breviusculo, *stipulis* parvis lanceolatis acuminatis nisi basi lato caducis; *cymis* paucifloris dichotomis laxiusculis, *bracteis* oblongo-lanceolatis obtusis; *calyce* magno lobis inæqualibus ovato-lanceolatis acuminatis acutissimis, corollam multo excedente; *corollæ* tubo late infundibulari-cylindraceo breviusculo, lobis 5 longe setaceo-acuminatis, pilis hinc inde paucis longiusculis conspersis; *bacca* glaberrima calycis a limbo persistente coronata.

Near Esuk Ekkpo Abassi. Fl. & Fr. May. No. 3300.

A remarkable species, the nearest affinity being clearly *C. nigrescens* Wernham; the present species is distinct, especially in the very large calyx and small corolla. The *leaves* measure 10–11 cm. × 4–4·5 cm., with petiole about 1 cm. long; secondary nerves 5–6 pairs; *stipules* 6–8 cm. long. *Peduncle* 3 cm.; *cyme* 11–12 cm. wide, 5–6 cm. long. *Pedicel* 5 mm.; *calyx*-tube minute, lobes 3–3·5 cm. × 4–7 mm. *Corolla*-tube barely 5 mm. long, and nearly as much in average breadth; lobes, flat part 4–5 mm., setæ over twice that length. *Berry* 1·4 cm. × 1·1 cm.

"Youngest flowers white, older ones cream, oldest thin orange.

Centre of flower greenish. Calyx-lobes bright green, with margin and setæ white. Setæ of corolla-lobes white; anthers dark-purplish brown; style white, stigma pale green" (Mrs. Talbot).

Coffea eketensis Wernham, sp. nov. Frutex ramosissima, ramis divaricatis decussatis novellis minute puberulis; *foliis* chartaceis ellipticis, utrinque angustatis, brevissime petiolatis, apice subacutis, utrinque ipsis in venis glaberrimis, venis secundariis paucis distantibus, petiolo puberulo, *stipulis* a basi lato brevissimo setaceo-apiculatis; *floribus* in axillis solitariis præcocibus, *bracteis* exterioribus epicalycem tubularem dentibus lineari-lanceolatis acutissimis acuminatis formantibus, *bracteolis* lanceolatis acuminatis acutissimis valde concaveis; *calycis* minutiusculi lobis late rotundatis 8; *corollæ* tubo gracillimo lobis oblanceolatis apice rotundatis.

Along the rivers, and 2–3 miles from Oron on the Eket road. No. 3064.

Leaves about 5 cm. × 2·5 cm., secondary veins 3–4 pairs; *petiole* 2 mm.; *stipules*, including the setaceous apiculus, about 4 mm. long. *Bracteoles* 1 cm. long. *Calyx* barely 1 mm. deep. *Corolla*-tube 2–2·3 cm. long, lobes 7 mm. × 2 mm.

Allied to *C. jasminoides* Welw., differing principally in the thicker leaves with glabrous and fewer veins, and the less precocious flowers with 5-lobed corolla.

"Flowers white, bracts bright-brown, calyx-lobes bright pale-green" (Mrs. Talbot).

Cephaelis Talbotii Wernham, sp. nov. Frutex glabrescens, 10–15-pedalis, ramulis complanatis bifariatim ferrugineo-pubescentibus; *foliis* magnis ovalibus v. ellipticis basi acutis, breviuscule acuminatis apice subacutis, utrinque nisi subtus in venis sparse puberulis glabris, venis supra impressis subtus conspicue prominentibus, petiolatis, *stipulis* bipartitis ovatis acuminatis basi ferrugineo-pubescentibus membranaceis; capitulorum multorum *inflorescentia* in axillis longepedunculata trichotoma, *bracteis* primariis paucis lanceolatis foliosis, *capitulis* parvis, involucri bracteis ovato-lanceolatis interioribus dentatis v. 2–3-fidis; *calycis* limbo infundibulari brevissime et inæqualiter dentato, dentibus apice rubescentibus; *corollæ* nisi in ore barbato glabræ tubo subglobose ampliato sub lobos oblongos patentes apice incurvato coriaceo.

Oron-Eket main road. No. 3386.

The *leaves* measure about 15–25 cm. × 8–11 cm., with stalk 1·5 cm. long; secondary nerves about 18 pairs, each half of the *stipule* 2 cm. × 6 mm. *Peduncle* 8–9 cm. long; *bracts* 1·3 cm. × 2·5 mm. *Inflorescence*—a rather lax cyme of small capitula—about 4·5 cm. in diameter, and 3·5 cm. in length, each head being 8 mm. in diameter. Ovary and *calyx*-limb together barely 1·5 mm. *Corolla*-tube 2 mm., lobes about the same length.

The nearest allied species is *C. cornuta* Hiern, which differs, however, chiefly in its pubescent corolla with differently shaped lobes.

The collection includes a Rubiaceous plant in fruit, which appears to be a *Cephaëlis*. The inflorescence is a trichotomous umbellate cyme of small heads, each of about 1·8 cm. diameter, and comprising as many as a dozen small, ellipsoidal, longitudinally furrowed glabrous berries 5 mm. long and 3·5 mm. broad. Each berry is crowned by the persistent, membranous, reddish calyx-limb 1·5 mm. high, with short, narrow, sub-setaceous teeth. The branches of the inflorescence, like the peduncle (7–8 cm.), are densely rufo-pubescent; the whole inflorescence measures over 7 cm. across. The reddish, papery bracts are from 6-10 mm. long. The single leaf which the specimen bears is glabrous (except for the puberulous midrib below), obovate narrowed toward the base into a petiole about 1 cm. long, and shortly acuminate with subacute apex; the blade measures 22 cm. × 10 cm.; secondary nerves about 20 pairs.

I have little doubt that this plant is a fruiting specimen of *C. cornuta* Hiern. The latter species (Fl. Trop. Afr. iii. 224) is based on a specimen gathered in Old Calabar by Dr. Robb, and preserved in the National Herbarium. This consists of about ten loose inflorescences in the flowering stage, with a couple of more or less immature leaves. The structure and indumentum of the inflorescence, the bracts, and the calyx, are all identical with those in Talbot's plant, and the leaves of Robb's specimen may be reasonably conceived as representing an earlier stage of the leaf in the plant before us.

(To be concluded.)

DISTRIBUTION OF UTRICULARIA IN BRITAIN.

By Arthur Bennett.

In this account I have added the records for the Watsonian counties which have come to my knowledge since the publication of the Supplement to Top. Bot. ed. 2 (Journn. Bot. 1905, Supplement).

U. vulgaris L.

60. Lanc. W. Flora.
104. Ebudes N. J. Bot. 1910, 225.
109. Caithness. Miss Lillie sp.

U. minor L.

37. Worcestershire. Flora 280.
76. Renfrew. Ann. Scot. N. Hist. 1894, 106
89. Perth E. Sturrock in Perth Herb. (var. *platyloba* Meister teste Glück).

U. major Schmidel (*neglecta* Lehm.).

44. Carmarthen. Hamer sp.
46. Cardigan. Salter, 1906.
59. Lancaster S. Edinb. herb.!
63. York S. W. Cardiff herb.!
69. Westmorland. Martindale!
79. Selkirk. Marshall sp.
89. Perth E. Sturrock sp.
92. Aberdeen S. Trail sp.
96. Easterness. Ann. Scot. N. Hist. 1911, 171.
102. Ebudes S. McNeill sp.
109. Caithness. Lillie sp.
110. Hebrides. Shoolbred sp.

U. intermedia Hayne.

11. Hants S. Borrer in herb. Edinb.!
89. Perth E. Four localities, *teste* Dr. Glück.

90. Forfar. "Rescobie." Dr. Glück in litt.
91. Kincardine, 1848. Edinb. herb.! as *minor*.

Mr. Druce gives 96, 100, 105, in Ex. Club Report for 1910, 514.

The following counties are reported for *U. intermedia*, but need verification:—

25. Suffolk E. Winch add.
59. Lancaster S. Winch add.
67. Northumberland. Thomson, herb. Watson.
70. Cumberland. Winch Contrib.
81. Berwick. Border Flora.
85. Fife. Ann. Scot. N. Hist. 1901, 103.
92. Aberdeen S. N. Flora.
93. Aberdeen N. Trail.
95. Elgin. Druce.
107. Suth. E. Graham Excur.
Somerset? Devon?

U. OCHROLEUCA Hartm.

9. Dorset. Linton sp.
11. Hants S. Mennell herb.!
62. York N. E. Martindale.
69. Westmorland. Fox sp.
72. Dumfries. Corrie sp.
73. Kirkcudbright. Coles sp.
74. Wigton. McAndrew sp.
87. Perth W. Perth herb.!
88. Perth M. Ewing sp. (3200 ft.).
89. Perth E. Druce.
90. Forfar. Edinb. herb.!
91. Kincardine. Edinb. herb.!
96. Easterness. Dixon sp.
97. Westerness. Macvicar sp.
98. Argyll. Marshall sp.
99. Dumbarton. Watt sp.
101. Cantire. Ewing sp.
102. Ebudes S. Somerville sp.
103. Ebudes M. Macvicar sp.
104. Ebudes N. Ewing sp.
105. Ross W. Salmon herb.!
106. Ross E. Mennell sp.
108. Suth. W. Miller sp.
110. Hebrides. Shoolbred sp.
112. Shetland. Beeby sp.

U. BREMII Heer.

At present it is best not to report any county. That of N. Lancashire is an *error*, reported by me in Journ. Bot. 1912, 316. Dr. Glück pronounces the specimens only "*minor*." It differs from our Surrey *minor* considerably, the flower being double the size.

With the exception of the two southern counties, the distribution of *U. ochroleuca*, as at present known, is decidedly northern in Britain.

GIBRALTAR PLANTS.

By MAJOR A. H. WOLLEY-DOD.

THE following notes and descriptions relate to plants which it seems desirable to treat more fully than would be convenient in my Flora of Gibraltar now being issued as a Supplement to this Journal. I am indebted to Mr. N. E. Brown and Mr. Turrill respectively for the descriptions of *Euphorbia gibraltarica* and *Rynchospora alba* var. *pauciseta*, and to Dr. Stapf for assistance in that of *Atropis iberica*.

DELPHINIUM PEREGRINUM Linn. Sp. Pl. ed. 2, p. 740. Linnæus described the inner petals of this species as subrotund, and the specimen in his herbarium has them subcordate at the base of the limb. Most authors, however, have regarded them as elliptical and more or less narrowed below, and from this, together with the synonymy cited, much confusion has arisen. Boissier (Voy. Bot. pp. 12–13) recognized that in this species and its allies or varieties the lateral petals vary indefinitely in form, and his *D. peregrinum* covered species and varieties with them either orbicular and subcordate, or elliptical and more or less narrowed below. De Candolle (Fl. Fr. vi. p. 641) appears to have been the first to describe a species, *D. junceum* DC., having elliptical lateral petals, his *D. cardiopetalum* and *D. gracile* having them suborbicular. In addition to the form of the petals, the aggregate species varies indefinitely in leaf-cutting and habit, the racemes being sometimes dense and compact, and at others elongate and lax, while the leaves are firm or flaccid, close-set or distant, so that a subdivision into fixed species has not proved satisfactory.

Perez Lara (Fl. Gad. p. 89) observed that *D. longipes* Moris (*D. peregrinum* var. *longipes* Boiss.) always has suborbicular lateral petals, and proposed the following arrangement:—

D. peregrinum Linn. α *genuinum* (*D. peregrinum* Boiss.). Lateral petals elliptical, attenuate at base, the racemes either short or elongate (*D. junceum* DC.).

β *cardiopetalum* (*D. cardiopetalum* DC.). Lateral petals suborbicular, truncate at base.

Subvar. *longipes* (*D. longipes* Moris). Lateral petals orbicular, subcordate.

Subvar. *gracile* (*D. gracile* DC.). Lateral petals ovate, cordate.

This arrangement has the defect of restricting typical *D. peregrinum* Linn. to a form with elliptical narrowed lateral petals, which its author did not intend, also of making no substantial difference between subvarieties *longipes* and *gracile*, which seem to me identical.

A better arrangement, which I am following in my Flora of Gibraltar, is that of Boissier (*l. c.*), though the definition of his aggregate species and in part the synonymy are my own, *viz.*:—

D. peregrinum Linn. Lateral petals suborbicular, truncate or subcordate at base, or elliptical and more or less narrowed below.

Var. *confertum* Boiss. (*D. cardiopetalum* DC., *D. halteratum* Sibth. & Sm.). Racemes dense.

Var. *longipes* Boiss. (*D. longipes* Moris, *D. junceum* DC., *D. gracile* DC.). Racemes elongate, lax.

In the neighbourhood of Gibraltar I have only seen the form of var. *longipes* with truncate or subcordate lateral petals, which is very common in all sandy places, but the following are recorded:—

D. gracile DC. Uncultivated sandy places and cornfields at Algeciras, *Reverchon.*

D. peregrinum Linn. var. *confertum* Boiss. Near Algeciras, *Schott.*

Var. *longipes* Boiss. Catalan Bay and on the Neutral Ground, *Boiss.*, *Kelaart*, *Dautez*, and on the slopes of San Roque, *Boiss.*

Umbilicus citrinus, sp. nov. (§ Cotyle). (*U. pendulinus* DC. var. *bracteosus* Willk. in Willk. & Lange, Prodr. Fl. Hisp. Suppl. p. 213.) Herba caule circa 0·5 m., foliis radicalibus peltatis, longe petiolatis, caulinis ——; racemis secundis, circa 15 dec. longis, floribus horizontalibus vel pendulis, pedicellis 2·5–3 mm., bracteis hyalinis, pedicellis duplo longioribus, calicis lobis triangularibus acutis, vix 2 mm. longis, corolla flava, 9–12 mm. longa, cylindrica, sub lobis contracta, lobis ovato-lanceolatis, nervo valido excurrente notatis, carpellis corollæ tubo duplo brevioribus, antherarum basin vix attingentibus, antheris filamentis longioribus.

Differs both from *U. horizontalis* DC. and *U. pendulinus* DC. in being taller, in its secund racemes of longer bright yellow flowers, the corolla-tube constricted below the longer broader lobes, and in its much shorter carpels.

It grows sparingly by the Almoraima Soto (No. 2127), and in a neighbouring valley near Long Stables. Reverchon's No. 571 from shady woods near Grazalema also belongs here.

Umbilicus pendulinus DC. var. truncatus, var. nov. Herba foliis omnibus basi truncatis vel subcordatis, profundius lobatis, petiolis lateralibus.

The cauline leaves of this species are frequently laterally petioled, but in the variety even the lowest radical have that peculiarity.

On roofs of houses in Palmones Village (No. 751).

Sedum Winkleri, comb. nov. (*S. hirsutum* subsp. *bæticum* Rouy. *Umbilicus Winkleri* Willk.) Specimens sent to Willkomm by Winkler, from the S. Carbonera were described by him as *Umbilicus Winkleri* in Act. Soc. Bot. Germ. 1883, p. 268, and figured in Ill. Fl. Hisp. i. pl. 74 a. Later, in 1887, Rouy, in Bull. Soc. Bot. Fr. xxxiv. p. 441, described a subspecies *bæticum* of *Sedum hirsutum* All., based upon specimens sent from the S. de Palma by Reverchon, differing from the type in being larger, more glandular, leaves longer, and flowers twice the size.

I have seen no specimens from either collector, but one collected by Porta and Rigo on the S. Carbonera, labelled *Umbilicus Winkleri* Willk., and plants seen there, as well as on the Alcadeza Crags and in the S. de Palma, agree exactly with Willkomm's figure and description, as well as that of Rouy, and I have little doubt that both authors have described the same species. Rouy, however, has overlooked the important feature of the plant—that the petals are united at the base for about one-third of their length, instead of at the base only—which doubtless caused Willkomm to place it in *Umbilicus*, but as this character is variable in *Sedum*, and the plant so closely resembles a large variety of *S. hirsutum*, I propose to keep it in the genus under the name given above.

It grows in considerable quantity on rather damp rocks on the summit of the S. Carbonera (No. 1293), in the Waterfall Valley in the S. de Palma, and on the Alcadeza Crags. Specimens by Bourgeau from S. de Monchique, Algarve (No. 1872), and S. de Guadarrama above Chozas (No. 2218), also belong here.

CALLUNA VULGARIS Salisb. var. DEPRESSA, var. nov. Planta prostrata, ramis tortuosis, dense intertextis; racemis paucifloris.

Plain east of Queen of Spain's Chair, near Gibraltar, abundantly (No. 48).

Its habit gives this variety a very distinct appearance, and no other form occurs in the immediate neighbourhood, though the type is abundant on the mountain itself and in other parts of the district.

Euphorbia gibraltarica N. E. Br., sp. nov. (§ ANISOPHYLLUM). Herba annua, caulibus prostratis, tenuibus, a basi plerumque divaricate ramosis, ramis 8–12 dcm. longis, basi undique longe sed parce hirsutis, apicem versus superne brevius puberulis, inferne glabris, foliis oppositis, breviter petiolatis, 12–20 mm. longis, 6–9 mm. latis, oblongis, basi oblique cordatis, apice rotundatis obtusisve, sæpe macula lata fusca notatis, argute nec profunde serratis, serraturis apiculatis, inferioribus longe sed inconspicue pilosis, superioribus glabris aut basi longe ciliatis, stipulis minutis, libris, triangularibus, circa 1 mm. longis, involucris in inflorescentiæ furcibus solitariis et per 3 terminalibus, anguste obconicis, in pedicello eis æquante aut superante sensim attenuatis, glabris, glandulis 4, minutis, appendicibus suborbicularibus aut transverse ellipticis, 0·5 mm. latis, intensius roseis; capsulis 2 mm., globosis, lævibus, glabris; seminibus 1·4 mm. longis, 0·8 mm. latis, nigrescentibus, subtetragonis, angulis tribus carina pallidiore obtusa notatis, quaterno anguste canaliculato, foveolato-reticulato.

On railway ballast at Second Venta, near San Roque (No. 2192).

Near *E. Peplis* Linn., but differs greatly in seed and other characters, and quite distinct from any European *Euphorbia*.

Asphodelus serotinus, sp. nov. Herba rhizomæ fibris elongatis, carnosis, fusiformibus; foliis ut in *A. microcarpo*, at sæpius glaucissimis; caule $1\frac{1}{4}$–2 m., vulgo 1·5 m., graciliusculo, pallido, glauco, sæpe ramosissimo; pedicellis nec sub anthesi nec statu fructifero multo patentibus, paulo supra basim articulatis; floribus eis *A. microcarpi* similibus; periantho 15 mm. longo, albo, vitta olivea-viride lineato; bracteis pedicelli articulum inferiorem æquantibus, late lanceolatis, pallidis, vitta centrali fusca; staminibus perianthium æquantibus vel paullo longioribus, stylo multo brevioribus, filamentis ad medium usque minute puberulis, ungue 3 mm. longo, latitudine quam longitudine paullo majore, valde ciliato, faciebus subglabris; capsula quam in *A. microcarpo* minore, 6 mm. lato, $4\frac{1}{2}$ mm. longo, valde pyriforme aut in collum pedicelli apice hemisphærico angustiorem contracto.

Anthesis Aprili serotino, quo tempore *A. microcarpus* defloratus est. Near *A. microcarpus* Viv. but differs in time of flowering (late April), altitude, and especially in the form of the capsule.

Dried specimens look very like small-fruited forms of *A. microcarpus*, but there is no doubt that it is quite distinct from any form of that species growing in the neighbourhood of Gibraltar.

As I did not discover it till *A. microcarpus* was quite past flowering, I was unable to compare the claws of the filaments in the fresh state, but from my notes they are broader in proportion to their length than those of *A. microcarpus.*

Abundantly from the Alcadeza Crags to Boca de Leon, in the Cork Woods, and succeeds *A. microcarpus* in that neighbourhood (Nos. 1818, 1961).

RYNCHOSPORA GLAUCA Vahl var. PAUCISETA Turrill, var. nov. A planta typica foliis angustioribus, spiculis majoribus, setis paucioribus minoribus recedit; a var. *chinense* C. B. Cl. setis paucioribus minoribus distinguitur.

Neither typical *R. glauca* Vahl nor any variety of it has been recorded before from Europe. The present plant is therefore extremely interesting, both as extending the known distribution of the species and also as forming the type of a new variety. The original *R. glauca* was described by Vahl from specimens collected in Jamaica, and the present plant differs from it in having long, narrowly linear leaves (a somewhat variable character in this species), spikelets up to 6 mm. long, and either no bristles, or from one to three (most often two) much reduced ones, which are always shorter than the nut (excluding the beak), and sometimes only represented by small protuberances less than 1 mm. long at the base of the nut. The Gibraltar plant comes much nearer the variety *chinensis* C. B. Cl., and the only constant distinguishing features are found in the reduced bristles of the former. If the variety *chinensis* is kept as a species, as Boeckcler, its first describer intended, the variety *pauciseta* should be considered a variety of it rather than as a variety of *R. glauca.*

At the Waterfall, Garganta del Aquila, S. de Palma, Algeciras, *Wolley-Dod*, Nos. 1348, 2088.

Atropis iberica, sp. nov. Cæspitosa, culmis 6 dec., intensius glaucis, foliis juventate conduplicatis, tandem subplanis, 2·5–3 mm. latis explanatis, nervis utraque facie 3–4 subprominentibus, ligula ad 5 mm. longa, ovali-lanceolata, ex basi decurrente acute acuminata, paniculis 16–24 cm. longis, laxis, paulo nutantibus, deorsum visu sæpius subunilateraliter triangularibus, rarius symmetricalibus, ramis ex quoque nodo 2–3, inæqualibus, patentibus, longioribus basi breviter nudis, pedicellis plerumque 1–2 mm. longis, spiculis variegatis, 8–10 mm. longis, flosculis 5–6 (rarius ad 8) 5 mm. longis, glumis conspicue inæqualibus, explanatis ovato-lanceolatis, acutis, inferiore uninervia, superiore trinervia quam inferiore duplo longiore, ad mediam usque flosculi proximi attingente, paleis subæqualibus, inferiore acuta, vel breviter acuminata, edenticulata, subvalidius quinquenervia, nervis exterioribus subprominentibus, basim versus sæpe pubescente, superiore dense ciliata, antheris 3 mm. longis.

Ab *A. Foucaudii* Hack. differt ligula elongata acuta, gluma inferiore 1-, superiore 3-nervia (haud 3- et 5-nerviis), magis acutis, paleis acutis vel acute acuminatis, apice anguste membranaceo-marginatis integris, antheris duplo majoribus.

In considerable quantity in the sandy bed of the Palmones River, near Algeciras, within tidal influence (2062). Dr. Stapf, who has very kindly revised my description, informs me that there are Portuguese specimens at Kew, labelled *A. festucæformis*.

ALFRED RUSSEL WALLACE.

(1823–1913.)

By the death of Alfred Russel Wallace, which took place at Broadstone, near Wimborne, on November 7th, the last of the giants of English nineteeth-century science is removed. He was born, of Scottish ancestry, at Usk, Monmouthshire, January 8th, 1823; "educated" at Hertford Grammar School, which he left before he was fourteen; and apprenticed to an elder brother who was a land-surveyor. This employment was distasteful: his attention had already been turned towards Natural History, and, as in so many other cases, Humboldt's *Personal Narrative* had fired him with a desire to visit the Tropics. It is noteworthy that he began by collecting British plants, though he was eagerly reading books of travel, so that when, during a short time in 1844-5, when he was acting as a master in the Collegiate School at Leicester, he made the acquaintance of Bates, then already an ardent entomologist, it required but little encouragement to make him decide to start for America. He himself says (*Travels on the Amazon, Preface*):—"My attention was directed to Pará and the Amazon by Mr. Edwards's little book, *A Voyage up the Amazon*, and I decided upon going there, both on account of its easiness of access and the little that was known of it compared with most other parts of South America. I proposed to pay my expenses by making collections in Natural History, and I have been enabled to do so." Writing to Bates at the time, he expressly says that one of their objects must be the collection of facts "towards solving the problem of the origin of species"; but, although they were not then published, it must be remembered that Darwin had then not only received the initial suggestion of the theory of natural selection from reading Malthus on Population in 1838, but had, in June, 1842, and during the summer of 1844, written out the first and second abstracts of his theory.

Wallace and Bates sailed for Pará in April, 1848; and a year and a half later they were joined at Santarem by Spruce, another Collegiate School master, who, encouraged by Bentham and Hooker, and probably also, as Wallace suggests (Spruce, *Notes of a Botanist on the Amazon and Andes*, Introduction, p. xxxiii.), by what he heard from entomological friends at the British Museum of how successful Bates and Wallace had already been, had determined to undertake the botanical exploration of the region.

The three collectors separated, Wallace first ascending the Rio Negro to the Uaupés. In September, 1851, Spruce writes from Manáos (then Barra do Rio Negro) to John Smith, the Curator at Kew, that Wallace had just come down from the frontier bringing sketches of several palms, many probably new. Three months later he informs the same correspondent that Wallace, who had started up the Rio Negro a month before Spruce had done so, was "almost at the point of death from a malignant fever," whilst his younger brother, Herbert Wallace, who had come out with Spruce, had succumbed in the previous May. Wallace, however, having fortunately sent home his first two years' collections, started for England at the end of July, 1852. The vessel in which he sailed took fire, and the bulk of the specimens he had with him, his sketches and notes, were destroyed. After drifting ten days in open boats, Wallace and the crew were picked up; but the voyage had lasted eighty-two days when he landed in England on October 18th, 1852.

In 1853 Wallace published his little book on the *Palms of the Amazon*, illustrated from his own sketches. Though useful at the time, it was practically superseded by Spruce's classical "Palmæ Amazonicæ" in the Linnean Society's *Journal*, vol. xi. (1870). The same year saw the publication of *Travels on the Amazon and Rio Negro*, Bates's *Naturalist on the Amazons* appearing in 1863, and Spruce's *Notes of a Botanist on the Amazon and Andes* (edited by Wallace) not till 1908. Wallace's journal abounds in botanical notes, and contains one brilliant chapter specially devoted to the vegetation of the Amazon Valley. Few passages in his writings are better known than the paragraphs in this chapter in which he contrasts the gloomy solemnity of the tropical forest with the brilliant colours of temperate landscapes.

In 1854 Wallace started once more for the Tropics, reaching Singapore in July, spending in all eight and a half years in the Malay Archipelago, and collecting in Sumatra, Java, Timor, Celebes, Borneo, and New Guinea. An essay, written at Sarawak in February, 1855, and published in the *Annals and Magazine of Natural History* for September, 1855, "On the Law which has regulated the introduction of new species," is even more important in the history of biogeography than in that of biogenesis. Though it attracted the attention of Lyell, Darwin, and Huxley, Wallace was disappointed to find that it obtained little general recognition. It was after reading Malthus's book, as Darwin had done just twenty years before, that Wallace, while prostrated with fever at Ternate in February, 1858, wrote the essay "On the tendency of varieties to depart indefinitely from the original type," which he sent to Darwin, and which was read, together with Darwin's chapter "On the variation of organic beings in a state of nature," on the momentous July 1st, 1858, at the Linnean Society. Everyone is familiar to-day with the story of the admirable magnanimity with which the two great naturalists recognized each other's work.

"I have felt all my life, and I still feel," writes Wallace in 1870, "the most sincere satisfaction that Mr. Darwin had been at work long before me, and that it was not left for me to attempt to write *The Origin of Species*. I have long since measured my own strength, and know well that it would be quite unequal to that task." On the other hand, Darwin writes to Wallace:—"You are the only man I ever heard of who persistently does himself an injustice, and never demands justice."

In March, 1859, Wallace wrote to Dr. Sclater from Batchian accepting, with some suggested minor alterations, the six zoological provinces that Sclater has proposed; whilst another essay, written about the same time, "On the Zoological Geography of the Malay Archipelago," gives further details as to the boundary between the Indian and Australian regions that he located in Lombok Channel. Circumstances thus forced upon his attention the problems of the geographical distribution of animals, and both as collector and as writer he became a zoologist rather than a botanist.

The sale of his Malay collections brought him a small fortune, which, when invested, yielded a modest income for a single man; but in 1866 he married the daughter of William Mitten, the bryologist, by whom he had a son and a daughter; and his subsequent life in England was one of unremitting literary toil, at first in London and later at several successive country homes. The two fascinating descriptive volumes on *The Malay Archipelago*, published in 1869, were followed in 1876 by his *magnum opus*, the classical *Geographical Distribution of Animals*, which he himself described as an endeavour to do for the twelfth and thirteenth chapters of the *Origin of Species* what Darwin's own *Animals and Plants under Domestication* had done for the first chapter. *Island Life*, first published in 1880 and enlarged in the second edition of 1895, was supplementary to the main treatise, and had appended to it an elaborate treatment of the two subsidiary questions of the Glacial Period and the permanence of continents and ocean-basins. In this work there is a considerable amount of botanical matter. Profoundly influenced by the brilliant suggestions of Edward Forbes, Wallace was always impressed by the importance of geological history in dealing with the past and present distribution of land and water. He made much use of such considerations in modifying Croll's theory of the Glacial Period; and, though considered by a younger antagonistic school the champion of the permanence of continents and oceans, he constantly accepted very extensive distributional interchanges of land and water. *The World of Life*, one of his last works, deals with new evidence on the same questions.

In 1881 Wallace was granted a Civil List Pension: in 1882 the University of Dublin honoured itself by conferring upon him the degree of LL.D.; and other universities followed suit at later dates. From his receipt of the Royal Medal of the Royal Society in 1868 to the award of the first Darwin-Wallace Medal by the Linnean Society in 1908, Wallace's manifold services to biology have been fully recognized by his *confrères*; and he was naturally one of the earliest recipients of King Edward's Order of Merit.

This is not the place to deal with his many labours in various other fields, such as psychical research and land nationalization, nor can we do more than mention the valuable volume of essays *On Natural Selection* issued in 1875, and the popular exposition of the whole theory of evolution, as he understood it, in *Darwinism* (1889). While he differed from Darwin in his views as to the application of the theory to man, Wallace constantly asserted—even more strongly than Darwin himself had ever done—the sufficiency and controlling effect of natural selection, as opposed to the various post-Darwinian views on evolution.

G. S. Boulger.

SHORT NOTES.

Hypericum Desetangsii (Journ. Bot. 1913, 317).—Dr. A. Thellung, of Zurich, has kindly drawn my attention to three important papers upon the above plant and its nearest allies, *viz.*, *A. Fröhlich*, in Sitzungsberichte d. k. Akad. d. Wiss. Wien, math.-natw. Kl. cxx, 505, 1911, and the same writer in Œsterr. bot. Zeitschr. lxiii, 13, 1913. *A. Thellung* in Allgem. Bot. Zeitschr. xviii, 18, 1912. In the last-named paper *H. Desetangsii* is reported from "England"! I wrote to Dr. Thellung for further details, and he replies:—"The *Hypericum* from England seen by me was found by Prof. Dr. Hans Schinz, in the summer of 1903, in Camborne, Cornwall, growing spontaneously in the garden of the Rev. Hooper. The specimens are to be found in the botanical museum of Zurich University." I am glad to be able to add West Lancashire, v.-c. 60, to the list of counties possessing *H. Desetangsii*, as Mr. J. A. Wheldon recently sent me an example collected by him, labelled—"*H. dubium* forma. Bank of the Lune near Caton, W. Lancashire, Aug. 1900," which is undoubtedly the same as the Lewes plant.—C. E. Salmon.

Cumberland and Durham Plants.—In 1911 and 1912 my friend Mr. A. Wallis sent me examples of the following plants from the above counties:—

Durham, v.-c. 66. *Ornithopus perpusillus* L. In considerable quantity in one or two places on the Seaton sandhills. 1911. Interesting from the fact that Tate & Baker remark (Fl. Northumb. & Durham, 1868, 152), "Not seen anywhere recently."—*Centaurium pulchellum* Druce. Seaton sandhills. 1912. Not reported before, I believe, for Durham.—*Chenopodium glaucum* L. Slag heap, Old Hartlepool. 1912. Known there for twelve years.—*Polygonum litorale* Link. Tees estuary and Seaton sandhills. 1912. I think those who separate *P. Raii* and *maritimum* as species should, to be consistent, equally keep apart *litorale* and *aviculare*.—*Euphorbia Esula* L. On sandhills formed over an embankment of slag at Teesmouth. 1911.

Cumberland, v.-c. 70 (1911). *Cerastium tetrandrum* Curt. Sandhills near Drigg.—*Euphrasia Rostkoviana* Hayne. Near Stye Head Farm.—*E. scotica* Wellst. Borrowdale. This may be an addition for the county.—*Statice humilis* C. E. S. f. *nana* C. E. S. Esk estuary, near Eskmeals Station.—*Polygonum Raii* Bab. Esk estuary.—*Juncus Gerardi* Lois. Esk estuary, Drigg.—*Utricularia ochroleuca* Hartm. Ennerdale Lake.—C. E. SALMON.

NOTE ON SYMPHYTUM.—There has, I think, been much confusion between *Symphytum peregrinum* of Ledebour and *S. asperrimum* of Bieberstein. I suppose this is partly from their close resemblance when they are not in flower. They both grow in my neighbourhood (Tunbridge Wells), and I have not seen any mention of a difference I find in the shape of the petioles of their root-leaves. A cross-section of these will show this clearly. In *S. peregrinum* the proportions of this are 4½ (wide) by 4 (antero-posteriorly); in *S. asperrimum* 3½ (wide) by 7½, the groove on its upper surface being much deeper and narrower. This distinction is quite lost in the dried and pressed specimen, but in the living plant always available. One of the plants has a much wider limb, of a paler blue than the other. This I take to be the true *S. asperrimum*. If in this I should chance to be wrong, the distinction will still hold good, though in the reverse direction. A corresponding section in the case of *S. officinale purpureum* has its lower side (dorsum) much more widely curved than either of the others.—EDWARD G. GILBERT.

PLANTS OF SCILLY.—While sojourning among the Isles of Scilly in September last, I landed on the Great Ganinick—a conical pile of granitic rocks matted together by a dense growth of bracken, brambles, sea-beet and grasses—and found on the top *Calamagrostis Epigeios* in considerable quantity. This, I believe, has not been previously noticed in Scilly, and is a rare plant on the Cornish mainland. In a marsh near the coast on St. Mary's a peculiar form of *Juncus maritimus* was abundant—so plentiful that, a few weeks later, the crop was mown and carted away to thatch a cottage roof. In its ordinary state *J. maritimus* is short and stiff, with a panicle that is far exceeded by the sharp-pointed lower bract. The Scillonian plant is weak and tall, 4 to 5 ft., and the panicle is mostly larger and more diffuse, with a lower bract that never exceeds it, and is often not more than a sixth or a quarter its length. The only variety I find described—*J. rigidus* Desf.—does not fit my plant. I suggest, therefore, that this should be known as var. *atlanticus*. Of *Euphorbia Peplis*, which could not be found in Scilly some sixty years ago when Ralfs searched for it, we saw fifteen plants.—JAS. W. WHITE.

REVIEWS.

Mikrochemie der Pflanzen. By HANS MOLISCH. Pp. ix. and 395, with 116 text-figures. Jena: Fischer. 1913. Paper, 13 marks; cloth, 14 marks.

THE importance of microchemical tests in the study of the anatomy and physiology of plants has long been recognized, though it has been greatly exaggerated by some writers and under-estimated by others. At first glance, nothing could appear simpler or more obvious than the proposition that, since the reactions by which any given substance is recognized macrochemically will be yielded by that substance when the test is made under the microscope, the different kinds of cell-walls and cell-contents may be demonstrated by the use of reagents which either impart characteristic colours to walls and contents, or act as selective solvents, dissolving some of the walls and contents and leaving others undissolved, or produce precipitates whose nature furnishes evidence regarding the character of the substance that has united with the reagent to produce the precipitate. As is well known, valuable results have been obtained in chemistry and geology by the application of the microscope to the examination of small quantities of solid and liquid substances, but when we are dealing with the cells and tissues of plants, considerable difficulties are presented. The microchemical examination of a drop of water, even when several substances are dissolved therein, is a simple matter as compared with that of a plant cell containing perhaps a hundred different chemical compounds, and among these various colloidal bodies which interfere with crystallization and other reactions.

On the other hand, it must be remembered that in many cases a microchemical test may afford the only practicable method for the detection of substances which are present in quantities too small for macrochemical analyses, and that microchemical methods, used with due precautions, have many striking additional advantages.

The pros and cons of the subject are, however, admirably discussed by Molisch in the introduction to the book under review, which will be found of the utmost service to students of every branch of pure and applied botanical science. The author states that he has been engaged in the preparation of this book for more than twenty years, and that practically every reaction described has been repeatedly tested by him, the result being that the work stands in a class quite apart from the numerous compilations devoted partly or entirely to vegetable microchemistry which have hitherto been published. Throughout his descriptions of the modes of occurrence and methods of detection of the various substances present in the cell-walls and wall-contents, the author emphasises the need for caution in the interpretation of results and for obtaining confirmatory reactions in those cases where at present we have no reliable and certain method of demonstrating the presence of a given substance—*e.g.*, various glucosides and alkaloids—in the cell, or where the reaction is with probability or certainty to be ascribed to post-mortem chemical change, and so on. The author might with reason and advantage have pointed out still more explicitly that, while many of the results obtained by macrochemical analysis of plant extracts are vitiated by the neglect of investigators to distinguish between substances actually present in plants and those formed in the processes of extraction and testing, the necessity for caution in the interpretation of results is infinitely greater in the case of microchemical tests, the apparent simplicity of which tempts the unwary to rash conclusions; and that in a large degree it is the uncritical use of microchemical methods that has led to the somewhat sweeping and unjust condemnation which these methods have received from various quarters.

The author gives a concise account of methods, with a list of reagents, in the somewhat brief general portion of the book (pp. 1–36). The remainder (special portion) is divided into four sections, dealing respectively with inorganic bodies, organic bodies, the cell-wall, and inclusions of the protoplast and cell-sap. Full references to literature are appended to each section, and a good index facilitates the use of the book, which is illustrated by numerous excellent figures, the great majority of these being original. The work will be of the greatest value to teachers wishing to plan a course of instruction in microchemistry, while the lists of plants in which the various substances described occur, render the book of special interest to workers in systematic anatomy, since there can be no doubt that microchemical characters frequently give reliable indications of affinity or otherwise.

F. C.

Colloquies on the Simples and Drugs of India. By GARCIA DA ORTA. New edition (Lisbon, 1895). Edited and annotated by the CONDE DE FICALHO. Translated, with an introduction and index, by Sir CLEMENTS MARKHAM, K.C.B., F.R.S. 4to. Pp. xxi, 509. London: Henry Sotheran & Co. 1913.

THIS is the first English version of a very rare book, the third book printed in India in 1563, and "full of printers' errors." The work became known by Clusius's epitome of it, Antwerp, 1567, where the author is given as "ab Horto," a translation of his name into Latin; it further underwent a change into "Del Huerto," and is thus catalogued by the careful Dryander in his Banksian Library Catalogue. The original Portuguese text does not seem to have been reprinted adequately until Count Ficalho did so, as mentioned in the title-page of the volume now before us. (There was a faulty reprint issued in 1872.)

We have therefore to thank Sir C. Markham for translating the entire work from the Portuguese into English, providing an introduction and notes, and, with the help of Sir George Birdwood, giving the modern equivalents of the Indian names of the plants discussed, the addition of Acosta's figures, with three indexes, and copious notes.

The introduction states that Garcia da Orta was born in or about 1490, at Elvas, near the Spanish frontier. He reached Goa in 1534, where he is believed to have ended his days about 1570, having been practising as a physician in India for thirty-six years. It must have been several years before this that he was persuaded to put upon record his great knowledge of Indian drugs, of which this is the result. It is drawn up in a series of fifty-nine colloquies or conversations between da Orta and his friend Dr. Ruano, "the man in the street," a recent arrival at Goa, well read in the old authorities such as Dioscorides and Pliny, and ready to quote from them, to which opinions da Orta frequently opposes his own experience.

The first colloquy is concerned with the meeting of the two speakers; after that, the subject-matter of each discourse is usually confined to one drug, as Aloes, Amber, Camphor, Cinnamon, till in the last "Betel and some other things, in which some mistakes throughout the work are amended, which have been left through forgetfulness," as it is naively expressed.

In 1578 Cristóbal Acosta, a medical man of Burgos, published his *Tractado de las drogas medicinas de las Indias orientales*, Burgos, 4to; also turned into Latin by Clusius in 1582. The chief source of Acosta's text was the work of da Orta, but he added figures, and these cuts, twenty-three in number, have been reproduced in Sir Clement Markham's translation. The determinations of the plants mentioned are due to Sir George Birdwood, as already mentioned, to whom the volume is dedicated. It closes with indexes of persons and authorities quoted, of names of drugs, and finally of names of places.

Many subjects are discoursed of in a simple and entertaining manner, but an attempt to instance any would take us too far, and exceed the space at our disposal. For any one who has a taste for botanical archæology or the history of pharmacy, the present volume will be a very welcome addition to his bookshelves. The translator deserves the thanks of such for putting at our disposal an English version of one of the rarest volumes on Indian drugs.

B. D. J.

BOOK-NOTES, NEWS, &c.

Messrs. A. Brown & Sons, of Hull, London, and York, announce for publication "an entirely new work bringing the vegetational history of the county quite up-to-date"—*The Vegetation of Yorkshire*—by Mr. F. Arnold Lees, which will be issued to subscribers at 12*s.* 6*d.* net. The Preface, which is subjoined to the circular announcing publication, is so characteristic of the "free popular style which has always marked the author" that we venture to reprint it:—"Prepared originally, from personal observations and printed records stretching over 25 years, for the Yorkshire Naturalists' Union (who commissioned it), the inability of that body to issue it—the reasons do not concern the present venture—enables the Author and Publisher to unite to give this important work—on the lines of the Botanical Survey, using the three variously up-to-date Floras (Baker's, Lees's, and Robinson's) as a foundation—a worthier format, and a much wider dissemination than would otherwise be possible. It is no exaggeration to say that in the botanical world this 'Greater Flora' (J. D. Hooker) has been looked forward to, and its tardy completion urged on, in many wide apart circles, not only in England and Europe, but from New York to the Antipodes. Its subject—essentially an analysis of the wild vegetation of England's largest and most vari-surface county, is one that has bearings upon and is applicable in its factual incidences to many of the still larger island areas of the Temperate zones. No source of science delving into the facts of the past has been neglected; the question of 'fossil' seeds in earthy deposits, ancient or more recent, as well as sea-bed dredgings, etc., etc., which might throw light upon the origins, and persistings or passings of its floral features from century to century, has been systematically 'gone into,' and made the basis of a classification which departs widely from the worn, useless one of 'Natives,' 'Colonists' and 'Aliens' (for all plants must, at some beginning have been the last at first, even if the first at last in a usefully tentative view), while the authorities for all assimilated lemmas of nationale will be found fully acknowledged. The diction of a pen guided by a mind trained to insight as regards the question at issue, combined with a 'free,' 'popular' style, such as has always marked the author, will, it is believed, make the present work as distinct a step in advance as the Flora of 1888 was over those of the Babingtonian Days to which it succeeded."

M. C. Howard has issued a third volume of his important work, *Les Zoocécidies des Plantes d'Europe*, including those of both shores of the Mediterranean (Hermann, Paris, price 10 francs), which consists of a supplement representing the work on the subject during 1909-12. No student of galls can afford to be without this careful compilation, which contains numerous illustrations. There is an excellent bibliographical index, as well as one of the plants mentioned as hosts.

The chief interest, from the point of view of this Journal, of Mr. Aubyn Trevor-Battye's handsome and attractive volume containing accounts of his *Camping in Crete* (Witherby, 10s. 6d. net) centres in the appendix devoted to a consideration of the Cretan Flora, of which he gives a general view. The characteristic features of the flora are enumerated, with special notes upon some of the more interesting species, e. g. *Acer creticum*, of which the leaf-modifications by environment are described. The notes on the disposition of the forests, which are formed by *Cupressus sempervirens* var. *horizontalis*, *Quercus Ilex*, *Pinus halepensis* and *P. Laricio* are interesting: the author was much struck by the mischief caused by forest fires, which destroy the seedling trees, and made representations concerning this to the Government Department concerned with the forests of the island, which it is hoped may be attended with success. A list of the more conspicuous plants of the island and a brief bibliography bring the botany of the volume to a close. It is to be regretted that the proofs were not more carefully read: the names of plants are frequently misspelt, nor is the carelessness confined to them—*e. g.* Sibthorp's dates are given as *1873-94*. The narrative which forms the chief part of the volume is interestingly written, and is enlivened with numerous illustrations.

Mr. W. H. Johnson has compiled for use in connection with the study of the principles of agriculture in West African schools a little volume on *Elementary Tropical Agriculture* (Crosby Lockwood, 3s. 6d. net), which will it is hoped also prove useful in other tropical countries. It deals simply and clearly with the various parts of a plant, with chapters on soil, food, fungoid diseases and insect pests; a second part is concerned with the school garden and various matters connected with cultivation. There are twenty useful illustrations, and the book is admirably printed.

Mr. A. Bruce Jackson has printed for private distribution, at the request of the Duke of Northumberland, *A Catalogue of Hardy Trees and Shrubs growing at Albury Park, Surrey*—a companion volume to that on the trees of Syon House, published in 1910 and noticed in our volume for that year (p. 296). The book is divided into two parts, one dealing with the "gardens," the other with the "woods"; this necessitates a certain amount of repetition, and we should have thought the two might well have been combined, indicating by a prefixed initial which plants were found only in one or other of the divisions. The list has evidently been done with much care, and is very nicely printed; we note very few slips—"Phillyr*æ*a" (p. 25)—is one. There are brief but useful notes; references to important works are given; and a short history of the estate is given as a "foreword."

Dr. Henry Franklin Parsons, who died at Croydon, Surrey, on the 14th October, was an excellent "all-round" botanist. Born at Frome, Somerset, in 1846, of a large family, more than one member of which are well known in the world of art, he graduated in medicine with distinction in the University of London. His assistance in the *Flora* of his native county is acknowledged by its author and a manuscript list of plants observed by him is preserved in the Taunton Museum. Appointed Medical Officer at Goole, he paid considerable attention to the Yorkshire Flora, contributing a paper on maritime plants to the *Naturalist* in 1875, drawing up botanical reports for the Naturalists' Union for 1877 and 1878, and assisting Dr. Lees with his *Flora* (1888). Becoming Medical Inspector to the Local Government Board in 1879, a post which he held for thirteen years when he became Assistant Medical Officer, he devoted much of his leisure to the Croydon Natural History and Scientific Society, of which he became a Vice-President. In addition to geological and meteorological papers he contributed to its *Transactions* papers on the times of flowering of spring flowers (1897), on the flora of the commons near Croydon (1899, 1902), and on London casual plants (1906), and gave educational addresses to sections of the Society on hepatics, lichens, and other topics. He conducted many of their excursions and fungus forays, drawing up careful reports of the species observed, and also communicated an annual report on the weather in its relation to local vegetation down to 1912. He retired from the Local Government Board in 1911. For many years Dr. Parsons had also acted as examiner in sanitary science for the University of Cambridge. His herbarium has been bequeathed to the Somersetshire Archæological and Natural History Society, and is placed in the Taunton Museum.

PLANTS FROM THE EKET DISTRICT, S. NIGERIA

COLLECTED BY MR. AND MRS. P. AMAURY TALBOT.

(PLATE 529.)

(Concluded from p. 9.)

APOCYNACEÆ.

Gabunia Dorotheæ Wernham, sp. nov. Omnino glaberrimus, ramulis complanatis striatis fistulosis; *foliis* subcoriaceis late oblanceolatis v. elliptico-oblongis, basi acutis vix acuminatis, venis secundariis conspicuis plus minus distantibus, petiolo brevissimo v. obsoleto, *stipulis* valde conspicuis cavernulas altas axillares necnon vaginas interpetiolares formantibus; *corymbis* ad 15–20-floris, *pedunculis* longis folia nec tamen superantibus, basi ramulis adnatis, *pedicellis* longiusculis; *calycis* segmentis ovatis obtusis; *corollæ* tubo basin versus contorto insuper gracili, lobis oblanceolatis.

No. 3387.

Leaves 20–26 cm. × 9–11 cm., with stalk at most 2–3 mm. long; secondary nerves 8–14 pairs. *Peduncles* 8–11 cm. *Pedicels* 1–1·5 cm. *Calyx* 4·5 mm. long; *corolla*-tube 4·5 cm., lobes 1·1–1·4 cm. long, and to 4 mm. broad. *Anthers* sessile, 1 cm. above the base of the corolla-tube.

Nearly related to *G. eglandulosa*; it differs chiefly in the relatively shorter lobes and longer tube of the corolla.

Voacanga eketensis Wernham, sp. nov. Frutex ramulis complanatis glabris demum pallidis fistulosis; *foliis* papyraceis ellipticis utrinque angustatis obtusiusculis, supra glabris subtus in venis prominentibus minute flavo-puberulis, petiolo brevi puberulo supra altissime canaliculato basi ampliato; *inflorescentiis* dichotome umbellatis, in axillis summis geminis, omnino glabris, *bracteis* caducissimis, pedunculo sæpe decurvato glaberrimo; *calycis* late campanulati tubo intus supra basin a glandulorum zonâ induto, lobos latos rotundos demum reflexos superante; *corollæ* tubo supra contorto, in medio et sub lobos constricto, intus sparsissime hic inde puberulo, lobis patentibus oblanceolatis basi anguste oblongis, tubum superantibus.

No. 3388.

Leaves 13–16 cm. × 6–7·5 cm., secondary nerves 10–12 pairs, *petiole* about 6 mm. *Peduncle* 4–6 cm. *Calyx*-tube 6·5 mm., the internal gland-zone about 2·5 mm. above the base; lobes 4·5 mm. × 5·5 mm. *Corolla*-tube 1 cm., lobes 1–1·2 cm. *Anthers* 4 mm., including the slender straight tail 2 mm. long.

Near *V. puberula* K. Sch., but much more glabrous, the inflorescence being quite so; the proportionate lengths of tube and lobes in both calyx and corolla differ in the two species, and the anthers are much smaller.

Voacanga glaberrima Wernham, sp. nov. Frutex omnino glaber, ramulis teretibus novellis valde complanatis et sulcatis;

foliis magnis ellipticis utrinque angustatis subacutis petiolo basi inflato supra alte canaliculato; *inflorescentia* dichotoma pauciflora laxa, longepedunculata, duo quemque ad nodum in axillis oppositis, *bracteis* caducissimis; *floribus* mediocris, pedicellis longiusculis gracilibus, *calyce* infundibulari majusculo, tubo lobos oblongos obtusissimos paullum superante, intus glandulorum lineâ paullulum supra basin induto; *corollæ* tubo infra medium apicemque versus constricto, aliquanto contorto, lobos erecto-patentes oblongos obtusos subæquante; *staminibus* omnino inclusis.

No. 3389.

A very distinct species, with nearest affinity the Liberian *V. caudiflora* Stapf, from which it is readily distinguished by the large broad leaves and broad corolla-lobes. The *leaves* measure 18–29 cm. × 8–12 cm., with stalk not much more than 1 cm. long at most; secondary nerves 14–18 pairs. *Peduncles* 11·5 cm., each dichotomizing into secondary peduncles 2·5 cm. long; ultimate umbels with 2–3 flowers; *pedicels* 6 mm.; *calyx*-tube 7–8 mm., lobes 6 mm.; *corolla*-tube and lobes each 1–1·2 cm., the latter up to 3 mm. broad.

Pleioceras glaberrima Wernham, sp. nov. Frutex scandens glaber ramulis novellis gracillimis complanatis, demum cortice rugoso rubro indutis; *foliis* lanceolatis ad anguste ellipticis, utrinque angustatis, acuminatis, utrinque in venis ipsis subtus conspicuis glabris, petiolatis, subcoriaceis; *cymis* trichotomis minute et obscure pubescentibus pedunculatis in ramulorum summorum furcis singulis orientibus, *bracteis* minutis; *calycis* segmentis ovatis obtusis; *corollæ* extus glabræ latiuscule campanulatæ lobis oblongis obtusis tubum multo superantibus, lobo quoque supra basin squama oblonga carnosa obtusa apice modo libero, hujus etiam utroque latere in basi ipso appendice filiformi apice 4-fido capitato inserta onusto; *antheris* caudis valde incurvatis.

Main road from Oron to Eket, 28 miles, mostly in farm-clearings. No. 3038.

Similar to the previous species, its nearest ally, but distinct in the climbing habit, the single axillary inflorescences, and the shape and venation of the quite glabrous *leaves*. The latter measure 6·5–11 cm. × 2–4·3 cm., with stalk 5–8 mm. long; secondary nerves 6–8 pairs. *Inflorescence* 15 cm. wide or more, with peduncle up to 3·5 cm. *Calyx* 3 mm., *corolla*-tube 3 mm., lobes 7 mm.; filiform appendages 5 mm. *Anthers* 2–2·5 mm.

"Corolla-lobe cream-yellow shading toward flower-centre with brownish-red. Corolla-scales mauve-pink; filiform appendages each with 4 bright-yellow knobs" (Mrs. Talbot).

Pleioceras Talbotii Wernham, sp. nov. Frutex scandens glaberrimus latice viscoso, ramulis lævibus; *foliis* lanceolatis ad anguste ovalibus acuminatissimis acutis, brevissime petiolatis; *paniculis* densiusculis, *pedicellis* sæpe longiusculis tenuibus, *calycis* lobis rotundatis, *corollæ* lobis ovato-lanceolatis subacuminatis acutis, appendiculis filamentosis 10 simplicibus nec capitatis.

Oron-Eket main road, in farm-bush. No. 3008.

Distinct in its habit, its glabrous branches and acuminate leaves, acute corolla-lobes, and the simple filamentous appendages one on each side of each stamen.

Leaves up to 7 cm. × 2 cm., acuminate for $\frac{1}{3}$ to $\frac{1}{2}$ their length, stalks not exceeding 3–4 mm. *Pedicels* to 5 mm. or longer. *Calyx* barely 1·5 mm. *Corolla*-tube 4 mm., lobes nearly 5 mm. long.

"The latex is used as bird-lime. Calyx palest green, shaded purple at base, corolla-tube mauve, limb cream-yellow, mauve shade in centre of flower. Appendages very fine yellow" (Mrs. Talbot).

Pleioceras oblonga Wernham, sp. nov. Frutex 3-pedalis ramulis lævibus striatis; *foliis* plerumque elliptico-oblongis ad oblongis, breviter acuminatis acutis, basi obtusis v. subrotundis breviter petiolatis, utrinque glaberrimis; *paniculis* laxiusculis subcorymbosis; *calycis* lobis subrotundis; *corollæ* tubo lobos ovatos obtusos multo excedente, appendiculis filamentosis simplicibus necnon conspicue capitatis.

In drift-sand, or in the bush. No. 3111.

Related to the preceding species; differs especially in habit, and the much smaller corolla-limb with broadly ovate lobes, as well as in the capitate appendages.

Leaves to 10 cm. × 4 cm., acuminate for 1–2 cm. at most, petiole 4–5 mm. *Peduncle* 3–4 cm. *Pedicels* to 8 mm. long. *Calyx* 1–5 mm. at most in length. *Corolla*-tube 3–4 mm., lobes barely 2 mm. long.

"Flowers cream-yellow with ring of red in centre of corolla-limb" (Mrs. Talbot).

Pleioceras Stapfiana Wernham, sp. nov. Frutex ramulis glabris cortice rugoso fusco-rubro indutis; *foliis* pergamaceis ellipticis basi obtusis v. subrotundatis, breviter acuminatis obtusis, utrinque nisi subtus in venis obscure et interrupte minute puberulis, venis secundariis sæpius plus minus obscuris utrinque 5–7, petiolo brevi sparse pubescente; *floribus* in cymis terminalibus 2–3-chotomis ramulis divaricatis novellis sinuosis minute pubescentibus complanatis laxis diffusis dispositis, *bracteis* plurimis brevibus ovato-lanceolatis subobtusis ciliatis, *pedicellis* calycem sæpius superantibus; *calycis* segmentis ovatis breviter acuminatis obtusis; *corollæ* extus insuper minute pubescentis latiuscule campanulatæ lobis oblanceolato-oblongis tubum multo superantibus, lobo quoque supra basin squama oblonga obtusissima apice modo libero, hujus etiam utroque latere in basi ipsa appendice filiformi apice trifida inserta onusto; *antheris* caudis incurvatis.

Along the rivers. No. 3390.

Leaves 9–12·5 cm. × 4–6 cm.; petiole 6–9 mm. *Peduncle* 0 to 4 cm. *Inflorescence* attaining 16 cm. in width. *Calyx* 3 mm. long. *Corolla*-tube 3 mm., lobes 7·5 mm.; filiform appendages nearly 5 mm. long. *Anthers* rather more than 2 mm.

Related to *P. Gilletii*, differing especially in the ample lax diffuse inflorescences with long peduncles. I have named the species in deference to Dr. Stapf who has been unsparing with his assistance in my examination of the Apocynaceæ.

An interesting member of the collection is a species of Stapf's genus *Cyclocotyla* (Kew. Bull. 1908, p. 259) allied to *Craspidospermum*, of which there is ample material, including three or four mature flowers. The genus was based on a plant collected by Pynaert in the Congo Free State, and named *C. congolensis*. I have examined the type in the Kew Herbarium; this bears no open flowers. The leaves with their close transverse venation and the curiously cylindrical corolla-tubes are strikingly similar in *C. congolensis* and in Talbot's plant. On dissection, however, I find that each of the two ovary-chambers contains but two ovules placed one above the other—not five or six in two rows as in the Congo species. Further, in Talbot's plant, the disc is very deeply lobed, and the "calyx-cup" to which the genus owes its name (*vide* Stapf, *loc. cit.* 260) is not noticeable; and finally the inflorescences are axillary as well as terminal. The expanded corolla-limb is extremely small, and after the fall of the corolla the calyx closes rapidly over the top of the ovary. The ripe fruits would be interesting, but unfortunately none are available.

The characters just named led me at first to conclude that Talbot's plant should be referred to a new genus allied to *Cyclocotyla*. But the principal differences between the two may be due merely to immaturity in the specimens of *C. congolensis*. So that in the absence of further material it will be well, perhaps, to regard our plant as a second species of *Cyclocotyla* for the present, differing from the prior species in the closer leaf-venation, the axillary inflorescences, the shape of the disc, and the number and arrangement of the ovules.

Cyclocotyla oligosperma Wernham, sp. nov. Frutex scandens glaberrimus, ramulis gracilibus; *foliis* oppositis pergamaceis ellipticis v. oblongis breviter acuminatis obtusis basi acutis petiolo gracili longiusculo, venis secundariis plurimis approximatis transversis; *cymis* paucifloris laxiusculis alaribus v. terminalibus, pedunculatis. *Pedicellis* calycem multo excedentibus. *Calycis* tubo lobos subæquante. *Corollæ* tubo validiusculo limbum angustum multo superante, lobis subrotundis brevibus. *Ovarii* integri quoque in loculo ovula 2.

Kwa Ibo R. No. 3052. Fl. through the dry season.

Leaves about 10 cm. × 4 cm., petiole about 1·3 cm.; lateral nerves, thirty pairs or more. *Peduncle* up to 2 cm., or longer; pedicel to 5 mm. *Calyx* 3·5 mm. deep, about half occupied each by lobes and tube. *Corolla*-tube 8·5 mm. long; limb 5·75 mm. in diameter. *Anthers* nearly 5 mm. long, sessile at about 2 mm. above the base of the corolla tube. *Style* about 1 mm. long, of which about one-third or more is occupied by the stigma.

"Calyx and peduncles palest green. Corolla-tube cream, limb white with primrose centre. Stem and petioles shaded bronze; leaves very dark green" (Mrs. Talbot).

ASCLEPIADACEÆ.

Tacazzea pedicellata K. Schum. var. *occidentalis* N. E. Br. Fine specimens of this rare plant, represented hitherto only by the type-specimen at Kew from Lagos. No. 3265.

Tylophora smilacina S. Moore, sp. nov. *Caule* volubili gracili folioso puberulo hac atque illac ramuloso; *foliis* petiolatis cordatis apicem versus cuspidatis apice obtuse acutis optime 5-nervibus papyraceis utrinque (costis pag. inf. microscopice puberulis exemptis) glabris; *cymis* solitariis interaxillaribus sparsim puberulis 2–3-cymulosis cymulis sat distantibus subumbellatis sæpius 2–5-floris; *bracteis* minutis pubescentibus; *pedicellis* gracilibus calyce multo longioribus puberulis; *calycis* lobis ovato-oblongis obtusis extus pubescentibus; *corollæ* mediocris rotatæ lobis ovatis obtusis glabris; *coronæ* phyllis tuberculosis late ovoideis antherarum basin attingentibus columnæ stamineæ basi paullulum amplificatæ omnino adnatis; *antheris* erectis breviter appendiculatis; *stigmate* incrassato convexo antheras paullo excedente.

Near the Sacred Lake, Ikotobo, in thick bush. No. 3252.

Leaves 4·5–6 × 2·5–3·5 cm., drying brownish green above, paler below, very shining, nervation conspicuous especially the five main nerves; petioles usually 1–1·5 cm. long, slender, puberulous. *Inflorescences* mostly 6–8 cm. long. *Cymules* up to 1·5 × 1·5 cm., but usually smaller, the two lower frequently 1·5–2 cm. apart. *Pedicels* 7–10 mm. long. Calyx divided almost to the base, rather more than 1 mm. in length. *Corolla* pale crimson, when moistened nearly 1 cm. across, apparently purple, the lobes 4 × 2·5 mm. *Corona* pale, 1 mm. long. *Pollinia* minute. *Stigma* reaching 1 mm. beyond the tips of the anthers, 1 mm. in diameter.

To be inserted next *T. conspicua* N. E. Br., which has leaves different in several respects, considerably larger flowers with broader corolla-lobes, the staminal column greatly widened below, larger dark purple coronal-tubercles and a stigma which, while shorter than the anthers, is depressed at the apex and has a small convex boss in the centre of the depression.

T. liberica N. E. Br. A second Nigerian locality for this, the other being Oban. No. 3360.

Ceropegia Talbotii S. Moore. A second locality—the type-specimens from Oban. No. 3357.

LOGANIACEÆ.

Strychnos (§INTERMEDIÆ) **eketensis** S. Moore, sp. nov. Verisimiliter frutex scandens inermis ecirrosusque; *ramulis* foliosis, aliquanto tetragonis longitrorsum late sulcatis cortice glabro læte brunneo nitente circumdatis; *foliis* breviter petiolatis oblongo-ovatis apice sæpe breviter cuspidatis ipso obtusis obtusissimisve nonnunquam emarginatis basi obtusis vel rotundatis crasse coriaceis glabris utrinsecus sed præsertim pag. sup. nitidis costarum lateralium jugo basali margini approximato mox anfracto difficiliusque aspectabili jugo altero prominentiore ad 6-8 mm. supra basin costæ centrali imposito dimidio foliorum abaxiali marginem leviter appropinquante arcuatoque costis et costulis (ut reticulum laxum) subtus magis eminentibus; *cymis* foliis plane brevioribus axillaribus pedunculatis satis patentibus bracteatis bracteis late subulatis rigidis; *floribus* breviter pedicellatis pentameris; *calycis* segmentis suborbicularibus crassiusculis inferne regulatis microscopice ciliolatis; *corollæ* triente inf. indivisæ tubo calyci æquilongo faucibus villoso lobis triangulari-oblongis obtusiusculis crassiusculis in sicco dorso rugulatis; *antheris* basi villosis; *ovario* subgloboso sparsim piloso quam stylus inferne incrassatus paullo breviore.

No. 3237.

Leaves 13–17 cm. long, 6–8 cm. broad, in the dry state usually greyish green on the upper and brownish on the lower side; midrib very prominent below; petioles stout, channelled above, quite glabrous, 5–7 mm. long. *Cymes* usually 5–8 × 4–6 cm., the peduncles and branches puberulous, with very minute hairs; bracts 2–3 mm. long, shortly sheathing at the base, the inner face of which bears a number of glands. *Pedicels* usually 1–2 mm. long. *Buds* ovoid. *Calyx* nearly 2 mm. long, the lobes up to 1·5 × 2 mm. *Corolla* with tube 2 mm. in length and lobes 4 × 1·5 mm. *Filaments* 1·25 mm. long; anthers broadly oblong, obtuse, 1 mm. long. *Ovary* 1·25 × 1 mm.; style 2 mm. long.

Very near *S. memecyloides* S. Moore from Oban, but certainly different, on account of the glabrous branches, broader leaves, longer, open cymes, differently shaped buds and much larger flowers.

Gaertnera eketensis Wernham, sp. nov. Frutex (?) glaber ramulis gracilibus; *foliis* pergamaceis lanceolatis v. ellipticis v. oblongis acuminatis subacutis, basi angustatis breviter petiolatis, venis secundariis paucis distantibus reticulo interveniente plus minus transverso, *stipulis* membranaceis vaginam plus minus persistentem uno latere fissam formantibus apice irregulariter setosis; *panicula* terminali laxa thyrsoidea, ramulis minute pubescentibus, *bracteis* linearibus; *floribus* pentameris brevissime pedicellatis; *calyce* brevissime dentato v. subintegro; *corollæ* extus subglabræ tubo lobos lanceolatos superante, ore villoso; *antherarum* apicibus ut *stilus* stigmatibus minutissime puberulis exsertis.

No. 3391.

Near *G. Dinklagei* K. Sch., from which it differs, among other points, in the pentamerous condition of its flowers, with their relatively shorter corolla-lobes and almost entirely included stamens and exserted style.

Leaves 10–12 cm. × 3–4 cm.; lateral veins 5–6 pairs, petioles 5–7 mm. *Stipular* sheath at first about 5 mm. long, with setæ about the same length, later increasing to 8–10 mm. *Inflorescence* about 7 cm. × 5·5 cm. *Calyx* rather more than 7 mm. *Corolla*-tube 3·5 mm., lobes 2·5–3 mm.

BIGNONIACEÆ.

Kigelia Spragueana Wernham, sp. nov. Arbor 80-pedalis, *foliis* oppositis v. ternatis nonnunquam alternatis, *foliolis* obovatis v. oblongo-ellipticis brevissime acuminatis acutis integris glabris membranaceis utrinque tenuiter reticulatis, petiolulis brevissimis; *alabastris* in apice minute apiculatis; *calyce* subæqualiter dentato nec manifeste bilabiato dentibus latis brevibus subacutis; intus eglanduloso; *corollæ* tubo lobos suborbiculares minusculos multo superante; *disco* nec lobato; *ovario* glabro, *stigmatis* lobis ovatis obtusis.

Near Mkpokk. No. 3392.

Leaflets 11–13, 8-11·5 cm. × 3·5–5 cm., with stalks 3·5 mm.; lateral veins 6–8 pairs. *Calyx* 1·9 cm. long, lobes 4–5 mm. *Corolla*-tube 5·5-6 cm. long, constricted 1·8–2 cm. above the base; lobes about 1·5 cm. in diameter. *Stamens* inserted 1·5 cm. above the base of the corolla-tube; anthers 8 mm. long. *Ovary* nearly 1 cm. long.

"Flowers very dark terra-cotta" (Mrs. Talbot).

Near *K. elliptica* Sprague, with which Mr Sprague has been good enough to make a careful comparison of the present species. They differ, he points out, principally in the subequal toothing of the calyx in the latter; in *K. elliptica* the calyx is strongly bilabiate.

The leaf-arrangement is somewhat curious. In one specimen it is distinctly ternate; in another the leaves are set both oppositely and alternately. The latter may be due to twisting or adnation.

ACANTHACEÆ.

Thunbergia (§ THUNBERGIOPSIS) **Talbotiæ** S. Moore, sp. nov. *Caule* volubili sat crebro folioso puberulo; *foliis* petiolatis ovatis basi late truncatis interdum levissime cordatis apice breviter acuminatis margine distanter dentatis brevissimeve lobulatis raro subintegris basi 5-nervibus firme membranaceis supra scabridis vel saltem scabriusculis subtus pilis brevibus strigillosis indutis; *floribus* majusculis longe pedunculatis; *pedunculis* in axillis oppositis solitariis puberulis; *bracteolis* ovato-oblongis apice subito brevissime acuminatis nervis paucis parallelis in sicco haud perspicuis humectatisve et reticulum plane aspectabilibus percursis; *calyce* 5-angulari subtruncato (brevissime 5-dentato) pubescente; *corolla* bracteolas facile superante tubo basi angustato superne gradatim amplificato lobis suborbicularibus tubo plane brevioribus; *antheris* stam. duorum basi bicalcaratis duorum loculo altero calcarato altero mutico; *stigmate* infundibulari, subtriangulari.

In thick bush near Awa. No. 3394.

A slender-stemmed climbing plant. *Leaves* for the most part 6·5–8 cm. long, and 3–6 cm. broad, often 4–5 cm. in breadth at the very base, where may occasionally be seen a slight tendency to hastation, acuminate part ± 1 cm. long, with a filiform apex; *petioles* 7–20 mm. long, excavated above, puberulous. *Pedicels*

4·5–5·5 cm. long. *Bracteoles* 35 × 18 mm., thinly membranaceous. *Flowers* white. *Calyx* 1 mm. high. Narrowed base of *corolla* 8 mm. long, 5–7 mm. broad, widened portion 30 mm. long, at the throat 22 mm., diam 8; lobes up to 15 × 13 mm. *Filaments* fleshy, swollen below, 10 mm. long. *Anthers* shaggy-haired in front, 10 mm. long or somewhat less, the incurved spurs 2–3 mm. long. *Disk* fleshy, reaching as high as the calyx. *Ovary* glabrous, 3 mm. long. *Style* 22 mm. long, glabrous. *Stigma* 6 mm. in length, at the mouth 4–5 mm., broad, size gradually diminishing till at the bottom it is only 1 mm. in breadth. *Capsule* not seen.

This should be placed in the genus near *T. cordata* Lindau and *T. togoensis* Lindau, from both of which it differs in many important respects.

Physacanthus inflatus Clarke. Believed to be the first Nigerian record for this Cameroons plant. The flowers are mauve with white centre. No. 3301.

Asystasia dryadum S. Moore. Previously known only from Oban. No. 3114.

Justicia Talbotii S. Moore. Previously collected in the Oban district. No. 3396.

Dicliptera Talbotii S. Moore, sp. nov. Planta spithamea *ramulis* sat tenuibus aliquanto anfractuosis angulatis cito glabrescentibus; *foliis* parvis ellipticis basi apiceque obtusis tenuiter membranaceis glabris; *involucris* 2-floris in glomerulos breves ovatos densos vel densiusculos axillares terminalesve dispositis; *foliis floralibus* parvis linearibus subulatis patentibus glabris; *bracteolis exterioribus* oblongo-obovatis acutis 3-nervibus dense albo-incanis; *bracteolis interioribus* calycem æquantibus vel paullo superantibus anguste lineari-lanceolatis acutis incanis; *calycis* segmentis angustissime lineari-lanceolatis acutis puberulis; *corollæ* ex bracteolis breviter eminentis tubo cylindrico superne (ut limbus fac. ext.) piloso-puberulo labio postico suborbiculari antico obovato-oblongo 3-dentato, *staminibus* breviter exsertis.

No. 3217.

Leaves up to 25 × 13 mm., but usually smaller. *Inflorescences* at most 2 × 1·5 cm. *Floral leaves* about 3 mm. long. *Larger of the outer bracteoles* 8 × 3·5 mm., *smaller* 6 × 3·25 mm.; *inner bracteoles* 4–5 mm. long. *Calyx* 4 mm. long. *Corolla* 9 mm. in length; tube 6 mm. long, 1–1·25 mm. broad; front lip bright mauve, 4 × 1·5 mm., hinder white, 3·5 × 4 mm. *Filaments* 2·5 mm. long; *anthers* 1 mm. *Ovary* 1 mm. long; *style* pilose, 4 mm. long.

Near *D. Elliotii* C. B. Clarke, from which it can easily be recognised by the differently shaped hoary bracteoles.

Hypoestes Talbotiæ S. Moore. A second Nigerian locality; the type is from Oban. No. 3401.

VERBENACEÆ.

Clerodendron eketense Wernham, sp. nov. Ramulis molliter pubescentibus; *foliis* tenuiter membranaceis late ovalibus brevissime acuminatis acutissimis basi rotundatis v. subcordatis supra sparse subtus densius in venis pubescentibus, venis distantibus valde obliquis, petiolo longo dense pubescente, basi indurante persistente; *inflorescentia* thyrsoidea laxiuscula omnino dense pubescente, *bracteis* plurimis parvis lineari-lanceolatis, *pedicellis* 8–9 mm. v. longioribus; *calycis* ampli minute hispiduli lobis anguste ovatis acuminatis acutissimis tubum late campanulatum superantibus; *corollæ* tubo pro rata brevi, extus insuper præsertim densiuscule pilis glandulosis induto, gracillimo insuper plus minus subito ampliato, lobis oblanceolato-oblongis; *staminibus* porrectis nec longe exsertis.

No. 3393.

A well-defined species, distinguished by its soft short pubescence, the ample thin oval leaves with long stiff stalks directed outwards and downwards, and the large calyces with but a short length of the corolla exserted. The nearest allied species seems to be *C. Welwitschii* Gürke, but this has the corolla-tube nearly 4 cm. long.

Leaves 16 cm. × 10 cm., *petiole* 3·5–5 cm. *Inflorescence* about 10 cm. × 6 cm. *Calyx* 1·5–1·6 cm., lobes over 1 cm. *Corolla*-tube 1·7 cm., the lower slender tubular portion 1·3 cm., lobes 4·5 mm. *Stamens* exserted about 7 mm.

APETALÆ. By S. Moore.

Tylostemon (§ Hexarrhena) **confertus,** sp. nov. Frutex *ramis* ramulisque subteretibus striatis glabris; *foliis* sæpe majusculis petiolatis ovato-oblongis apice obtusis ipso apiculatis basi cuneatim coartatis tenuiter coriaceis utrinsecus glabris costis lateralibus utrinque circa 10 patentibus marginem versus arcuatis necnon dichotomis ut costa crassa centralis reticulumque sublaxum pag. inf. magis perspicuis; *paniculis* subsessilibus axillaribus raro terminalibus abbreviatis satis densifloris harum ramis ut pedicelli alabastraque subtilissime fulvo-tomentellis; *bracteis* late cymbiformibus extus tomentellis, *pedicellis* quam flores brevioribus; *perianthii* campanulati intus glabri lobis tubo brevioribus suborbicularibus; *staminum* serr. 1 et 2 filamentis abbreviatis crassis pubescentibus quam antheræ ambitu subquadratæ brevioribus; *staminodiis* ser. 3 columnaribus pubescentibus basi biglandulosis; *staminodiis* ser. 4 minutis, ovatis, pubescentibus; *ovario* subgloboso glabro, stylo inferne crasso superne attenuato æquilongo.

No. 3399.

Leaves when fully grown 16–20 cm. long and 6·5–7·5 cm. broad, others ± 10 × 5·5 cm., drying brownish; petioles stout, terete if not shallowly channelled above, longitudinally wrinkled, usually about 1 cm. long. *Panicles* many-flowered, usually not much more than 1 cm. in length, and often less than that, about 1 cm. also in width. *Bracts* few seen, 1·5–3 mm. long. *Pedicels* 1 mm. at most in length, usually shorter. *Perianth* 1·75 mm. long, 1·5 cm. in diameter just before opening; lobes ·75 × ·8 mm.

Fertile *stamens* ·5 mm. long; outer row of *staminodes* ·4 mm. long, the columnar portion a little longer than the diameter of the subglobular glands. *Ovary* ·4 mm. in diameter; *style* ·4 mm. long.

Near *T. obscurus* Stapf and differing from it chiefly in the congested inflorescences and the shape of the stamens and staminodes.

LORANTHACEÆ.

LORANTHUS (§ *Rufescentes*) TALBOTIORUM Sprague in Fl. Trop. Afr. vi. i. p. 1026 (*anglice*). *Alabastris* pilis frequenter ramosis dense ferrugineo-tomentosis; *ramis* validis (summun 8 mm. diam.) teretibus supra foliorum insertionem ferrugineo-tomentosis alibi tandem glabris pallide nitidis lenticellis paucis anguste elliptico-oblongis linearibusve usque ad 6 mm. long. præditis; *foliis* brevipetiolatis ovato- vel lanceolato-oblongis sub apice acuto recurvis basi angustissime cordatis 15–17·5 × 6·5–8·5 cm. crasse coriaceis supra glabris nitentibus subtus opacis et costa media furfuraceo-ferruginea exempta glabris; *umbellis* axillaribus fasciculatis pedunculatis 3–4-floris ferrugineo-pubescentibus; *pedunculis* 2·5 mm., *pedicellis* 1·5 mm. long.; *bractea* erecta ovata ellipticave apice rotundata extus pubescente intus glabra 3 × 2 mm.; *toro calyce* cum subcylindrico circa 2 mm. long.; *calyce* breviter denudato ·5 mm. long.; *corollæ* extus rufo-tomentellæ intus glandulosæ tubo fere usque medium unilateraliter fisso (ampulla basali inconspicua ovoideo-oblonga) 6–8 mm. long. basin versus plus minus curvato lobis erectis spathulatis 10–11 mm. long.; *filamentis* corollæ loborum basi insertis circa 8 mm. long.; *antheris* oblongis circa ·5 mm. long. harum loculorum septis 4; *disco* minimo ferrugineo-piloso; *stylo* glabro sursum metuliformi hujus parte incrassata pallidiori 6 mm. long. collo circa 1 mm. long.; *stigmate* capitato 5 mm. diam.

Hab. South Nigeria, Oban; *Mr. & Mrs. Talbot*, 1281.

The above is a translation of Mr. Sprague's description. It is inserted here because *L. Talbotiorum* has again been obtained by Mr. & Mrs. Talbot, this time in the Eket district. No. 3395.

L. BRAUNII Engl. var. TALBOTII, var. nov. A typo discrepat præcipue ob perianthium supra basin parvam inflatam maxime attenuatum, parte attenuata brevissima, in sicco modo 1 mm. long. totidemque diam. Basis inflata 1·5 mm. long. 3 mm. lat. No. 3400.

It is very difficult to discriminate between some supposed species allied to *L. Braunii*, which has led Mr. Sprague to unite several of them with the latter. He was good enough to examine the plant under notice, and it has been named as above in accordance with his advice.

EUPHORBIACEÆ.

Crotonogyne Manniana Müll. Arg. Male plant. Previously known only from Fernando Po. No. 3258.

C. Zenkeri Pax. Female plant. A Cameroons-Gaboon species, now first recorded as Nigerian. No. 3397.

Caperonia latifolia Pax. The leaves are smaller than usual

(3·5–4·5 × 1·8–2 cm.), and much like those of *Sutton Hayes*, 703, from Panama. The first Nigerian record for this species. No. 3398.

Maprounea membranacea Pax & K. Hoffm. Distribution: Cameroons and Spanish Guinea to Belgian Congo; now first reported as a Nigerian plant. No. 3253.

DESCRIPTION OF TAB. 529.

1. Branch with inflorescence, natural size, of *Talbotiella eketensis* Bak. fil. 2. Buds with narrow bracteoles, × 2. 3. Flower, × 2. 4. Longitudinal section through flower, × 8.

THE DISTRIBUTION OF CERTAIN BRITISH ALGÆ.

BY A. D. COTTON, F.L.S.

WHEN discussing the peculiar features of the marine flora of the West of Ireland in the report for the Clare Island Survey (Trans. Roy. Irish Acad. vol. xxxi. part 15), theoretical conclusions with regard to certain species were hampered owing to lack of precise data as to distribution. This applied not only to the Continental range, but also to that in our own country. Three of the most noteworthy were *Ptilota plumosa*, *Callithamnion arbuscula*, and *Codium mucronatum* var. *atlanticum*, each of which possesses a somewhat remarkable distribution in the British Isles. All three were plentiful in the warm waters of the Clare Island district, and they occur also on the west of Scotland, but none of them are found in any part of the English Channel or south-east of England. The difficulty with regard to the English east coast admitted of explanation; but it was not easy to understand why these plants should not extend by way of the Welsh coast to Devon and Cornwall.

The algal flora of Wales, from Anglesea to St. David's Head, is but poorly known; and it was not possible to state in the Report whether the species in question reached this region or whether they stopped short at a point further north. There was also a measure of uncertainty with regard to North Devon and North Cornwall, although this area had been often and thoroughly explored. Unlike some algæ, these are conspicuous species and of well defined habitats, so that they could hardly be overlooked if properly searched for. Two trips therefore were made to the Welsh coast during the past season with a view to certifying the presence or absence of these and other species, the districts chosen being Cardigan Bay (Barmouth to Aberystwyth) and Pembrokeshire (Newport Bay to near St. David's Head); whilst during a summer holiday at St. Ives some of the north Cornish coast between Padstow and the Land's End was examined.

The following notes refer only to the species mentioned above. It appears worth while to publish details of the trips instead of a mere statement of results, as the marine botany of Wales has been somewhat neglected.

We may first recall the distribution of the species in question.

Callithamnion arbuscula is a boreal alga. It is found in Norway, the Faeroes, Scotland and Ireland, and is abundant in the Clare Island district, forming a band on rather steep exposed rocks. In the much colder waters of the North Sea it does not occur south of Yorkshire, and on our west coast it was known to descend to Ayrshire and Isle of Man. *Ptilota plumosa* is also a northern species. Found in Iceland, Nova Zemblya, and Spitzbergen, it descends as far as Yorkshire on our east coast, and had been recorded from North Wales and the Isle of Man on the west. On Clare Island it is plentiful, being attached to the stipes of *Laminaria Cloustoni* and washed ashore in company with such southern plants as *Taonia* and *Callymenia reniformis.* It is supposed to occur right round Ireland. With regard to these two species it was pointed out (*l. c.* p. 170) that ecological factors appeared more likely to explain their absence on the south and west coasts of Great Britain than unfavourable currents or lack of spores. Both require an open rocky coast, and the scarcity of such ground south of Yorkshire may have limited their range in the North Sea, and prevented their access to the Straits of Dover. But on the west coast this explanation does not hold, rocky ground being plentiful both in north and south Wales. The third species, *Codium mucronatum* (first correctly identified during the Clare Island Survey), is a much more remarkable plant. Frequent in Australia and New Zealand, and almost identical with the form known as *Novæ Zelandiæ*, it is in Europe only known from the British Isles. Though long overlooked, it can happily be recognised with certainty in the herbarium, and its distribution was carefully worked out for the Clare Island Report. It occurs in Scotland from Orkney to Bute, and in the north of Ireland from Antrim to Donegal, and from thence southward to Bantry Bay. On Clare Island it is plentiful and conspicuous. In the Irish Channel it occurs on the Isle of Man, but is absent (as far as is known) from the east of Ireland, from England, and from the rest of Europe; also from the Atlantic coasts of North America. The plant can hardly have been introduced to Ireland, since it has existed in Bantry Bay for over a century. A special look-out for this alga should be kept, as any data that would throw light on its isolated position in Europe would be highly valuable.

1. *Cardigan Bay.*—The two regions investigated were those of Barmouth and Aberystwyth, advantage being taken of the British Mycological Society's meeting at Dolgelly in May 1913 to examine the coast-line in the vicinity. The rocks are slaty, Cambrian and Silurian respectively. In neither locality did the ground appear suitable for the algæ sought for. The shore is flat, and does not possess steep, clean, exposed rocks, the well-known habitat for *C. arbuscula.* No specimens of *L. Cloustoni* (the usual host of *P. plumosa*) were noted, but it is possible, and indeed likely, that that plant occurs in deeper water. Clean rock-pools, of the type in which *Codium mucronatum* flourishes, were also absent. At Aberystwyth a large amount of angular gravel is present (probably derived from glacial drift), and the injurious

effect of this on the vegetation is very apparent. During westerly gales and high seas the gravel is dashed over rocks; and even such tough plants as *Ascophyllum* are in places shorn off, while the scarcity of many of the more delicate species in pools which appear otherwise suitable, is no doubt to be attributed to the same cause. Through the kindness of Professor R. H. Yapp I was able to look through the algal herbarium at the University College, but though possessing a good variety of species for the type of shore, none of the algæ in question were represented. Professor Yapp informed me that similar ground continues as far south as Aberaeron, and that the same type of vegetation obtains: the presence of loose stones and sand would doubtless be specially inimical to *Codium mucronatum*, and he did not recollect having seen any representatives of the genus in the neighbourhood. The same factor is probably also operative on the flat rocky shore south of Barmouth, though it was not so clearly demonstrated. At Borth the ground is obviously unsuitable.

As far as Cardigan Bay is concerned, therefore, we may be fairly safe in saying that over a very large area (probably from Portmadoc to Aberaeron) the three species under consideration are absent, though as shown above this may be largely accounted for by unsuitable conditions.

2. *Pembrokeshire* (August 18th–21st). — Pembrokeshire appeared likely to prove interesting, not only from its rocks being of a different character to those of Cardigan Bay, but from its position at the extreme south-west corner of Wales. It was possible that the rock-loving species in question might obtain a footing in that neighbourhood, and that they might descend as far south as St. David's Head, though they were not known to occur on the coasts of Cornwall, the other side of the British Channel. Fishguard was chosen as a centre; it is easy of access, and, unlike Tenby and Milford, open to the west. But in this neighbourhood the precipitous cliffs are a great obstacle; and the time lost in going from one bit of accessible ground to another, when tides waiting for no man are in question, is a serious matter.

In a southerly direction the coast-line was examined at irregular intervals from Fishguard to a point about half-way between Strumble Head and St. David's. The cliffs and headlands are for the most part composed of volcanic rocks, and these descend sheer into the sea; but bays of slaty rocks, which are more accessible, are also present. The latter are strewn below with stones and gravel, and, as can be seen from above, they support little or no vegetation. Two near Pembrush Point were descended by paths none too safe, but practically no algal growth, save *Enteromorpha* and a small amount of *Fucus*, was found. Time did not permit of extending the search to the Head itself, but it is probable that the same type of coast continues. It is very unsuitable for littoral algæ owing to the steep cliffs and lack of reefs.

North of Fishguard a much better vegetation was met with.

Newport Bay, with its wide sweep, was hurriedly searched, and though not possessing a rich flora, was very much better than anything previously seen. On the rocks at the south-west corner (and probably at the north-east also) algal associations of the "exposed" series were found, the band of the short form of *Porphyra umbilicalis* being well developed. These rocks appeared suitable for *Callithamnion arbuscula*, but it was absent. Pools sufficiently clean and clear for *Codium mucronatum* were frequent, but not a plant was noted. Considering the date of the visit (August) the vegetation of this bay showed much variety, and in spring the flora must be a rich one.

A certain amount of rocky ground occurs between Goodwick and the old town of Fishguard. These rocks, which are easily reached by boat, possess a fair algal vegetation, but it is of the semi-sheltered type. A large amount of clean drift had collected, the examination of which gave a good idea of the sublittoral flora. No specimens of *Ptilota*, however, occurred amongst it.

By far the best piece of collecting ground was a little bay at Dinas. The rocks, slaty but not much broken, are accessible on either side of the bay, and the ground exhibits on the right the exposed type of rocky-shore formation, and on the left the semi-sheltered type, and the sand-and-rock series. These rocks, though they occupy a small area, have a very rich flora; and the sudden appearance of such a large number of species shows how generally the spores are distributed, and how ready the plants are to thrive when the conditions for their establishment are suitable. For an examination of the flora of the rocky shore of Pembrokeshire this little bay could hardly be beaten; indeed, for variety of ground and richness of flora in a compressed area, it is one of the best I have met with. By the road, which is hilly, Dinas Bay is four and a-half miles from Fishguard town and six miles from Fishguard Harbour Hotel. In good weather it is a pleasant sail of three or four miles from the G. W. R. quay at Fishguard.

On the right side of Dinas Bay the *Nemalion* association is well developed, and in its upper parts a distinct but rather sparse belt of *Callithamnion* is present. It was at once obvious that this belt was composed of *C. spongiosum*, and not of *C. arbuscula*, a conclusion which was confirmed by the microscopic examination of a number of specimens both saxicolous and epiphytic. A few pools exist, but *Codium mucronatum* was hunted for in vain. *Ptilota* also was not found. This concluded the search in south-west Wales. It is tolerably certain that *P. plumosa* is absent, and that *C. arbuscula* does not occur. Not a sign of the interesting *Codium mucronatum* was seen on any occasion.

3. *North Cornwall* (September).—The north Cornish coast is so familiar that it need not be described. Padstow, Newquay, and St. Ives were the spots specially investigated, each of which had been more or less worked by Mr. E. M. Holmes and by the late R. V. Tellam. St. Ives is poor for algæ, but the shore towards the south-west affords here and there some better ground. Both at St. Ives and at Newquay *C. arbuscula* was altogether absent,

though a slight growth of *Ceranium acanthonotum*, which is often a co-dominant species in the association, was present; *Nemalion* also, which enjoys similar conditions, formed bands and patches. At Padstow the ground is too sheltered for the *Callithamnion* or *Nemalion* belts, and time was not available for the exploration of the exposed coast-line in that neighbourhood. Pools occur near Padstow, as at Newquay and St. Ives, but *Codium mucronatum* was completely absent. *P. plumosa* also was not observed anywhere in Cornwall.

4. *North Wales.*—As this area had not been visited, an effort was made to obtain information by means of correspondence and examination of herbarium collections. Professor R. W. Phillips, of Bangor, was kind enough to supply notes, and also to lend a number of specimens from the Anglesea neighbourhood (chiefly Menai Straits and Puffin Island) from his private collection. The examination of these showed that whilst *P. plumosa* is plentiful in North Wales, the other two plants, *Callithamnion arbuscula* and *Codium mucronatum*, are not found. This was in agreement with Professor Harvey Gibson's list of algæ for the Liverpool Marine Biological Committee's district (Trans. L.M.B.C. vol. v. 1891, a copy of which was kindly lent me by the author).* Professor Harvey Gibson writes that he has not found *Codium mucronatum* on the north coast of Wales, but that *Callithamnion arbuscula* is plentiful in the Isle of Man, and specimens from that locality exist in the Kew collections. Mr. N. E. Brown, of Kew, has examined the shore around Llandudno, and he tells me he has never observed any species of *Codium* in the rock pools of that region.

We are now in a position to summarize the facts as to the distribution of these species. As far as Wales is concerned, *P. plumosa* is frequent on the rocky shores of north-west corner, but does not appear to extend south of Anglesea; *Callithamnion arbuscula* and *Codium mucronatum*, on the other hand, though common in the Isle of Man, do not reach the Welsh coasts at all. With regard to the British Isles, the *Callithamnion* and *Ptilota* are general in Scotland and descend as far as Yorkshire in the North Sea, and are abundant in the warm waters of the west of Ireland, but in the Irish Channel stop short at the Isle of Man and Anglesea respectively. Both are supposed to occur in the south of Ireland, but this requires confirmation. *Codium mucronatum* remains as mysterious as ever. No trace of it has been seen in the localities investigated in North or South Wales, and it may be safely stated to be entirely absent from Devon and Cornwall. It is still only known in Europe from the Atlantic shores of Scotland and Ireland (where it has existed since the early part of last century) and from the Isle of Man. Whether it is spreading at all it is not yet possible to say. Though Cardigan Bay as a whole is not good for marine algæ, a certain amount of excellent ground occurs here and there in both the northern and southern parts; and the presence of a very large number of species at Dinas Bay, Pembrokeshire, indicates that algal spores are widely distributed, and that the plants are ready to thrive when the conditions are suitable. Hence it is unlikely that geological factors are wholly responsible for the absence of the algæ we have been considering. Their distribution on the south and east of Ireland requires to be reinvestigated, and when this has been done it will be profitable to again consider the question of tides and currents. Meanwhile, this contribution as to their distribution in Great Britain may not be superfluous.

---

* A not irrelevant addition to that list may, however, be here noted, namely, the ordinary *Codium tomentosum*, which was found by Professor Phillips and is preserved in his herbarium. A fragment of a frond of *Ptilota plumosa*, inscribed "Ilfracombe E. T.," also occurs in his collection. But as the plant does not occur in this well-worked region, the locality given must be regarded as erroneous.

P.S.—Since the above was written, an interesting paper by C. L. Walton on the shore fauna of Cardigan Bay has come to hand (Journ. Mar. Biol. Assn. vol. x. No. 1, Nov. 1913, pp. 102–113). In describing the geological features of the bay, the author draws attention to the large quantity of residual drift, and its injurious effect on the fauna. He also notes the importance of the dip and strike of the older rocks, and remarks that when the strike is parallel to the coast, if the dip is low the rocks are barren; if high, with a landward dip, they are also barren; but if high and seaward, there may be a fairly good fauna on the landward slope. With regard to these factors, contrasts as well as similarities will be seen when the algal vegetation is considered. Geological points of this nature have been largely overlooked by writers on algal ecology; but it is clear that for the more detailed study of the vegetation they must be carefully considered, as they not only directly account for the presence or absence of certain associations, but in the case of hard rocks, especially, largely determine the general contour of the foreshore. The points emphasized by Mr. Walton do not, however, throw any further light on the algæ discussed above.

DORSET PLANTS.

By H. W. Pugsley, B.A.

During the summer of 1912, and again in 1913, I spent a fortnight at Swanage, which is a good centre for field botany. The following brief notes may be of interest. On both occasions I searched on the east side of Littlesea for *Scirpus parvulus*, but without success; and as other botanists have recently similarly failed to find it there, I fear it may have been extirpated by the inroads of the sand, which at some points is obviously advancing towards the lake. In 1913 I was accompanied on several walks by Mr. C. B. Green, who is compiling a very exhaustive list of local records.

Fumaria officinalis L. var. *Wirtgeni* Haussk.—Quite typical near Wareham Railway Station.

Spergularia marginata Kittel.—In the *Flora of Bournemouth* this is recorded only for Keysworth (near Wareham), but in following the shore of the harbour from Poole to Sandbanks it was found to be nearly as common in the salt-marshes as *S. salina* Presl. It still occurs on the dry cliffs at Tilly Whim, with *Aster Tripolium*, as recorded in the *Flora of Dorset.*

Astragalus glycyphyllos L.—A single plant of this was observed in 1912 on a grassy roadside between Swanage and Durlstone Head. Its origin there is not easily explained, as it is not a species likely to be introduced; and it may occur naturally in some of the enclosed ground in that vicinity. It is recorded for Dorset by Pulteney without locality, and the only specific habitat in the *Flora* is "Between Ashmore and Rushmore" in the north-east of the county.

Atriplex laciniata L.—The *Flora of Dorset* remarks of this plant "North and South Haven beaches, Bell Salter; not confirmed since Pulteney's time," and the *Flora of Bournemouth* states "an old record not confirmed of late." Mr. Salmon (Journ. Bot. 1911, 365) notes the species for South Haven, and in 1913 it occurred in fair quantity on the beaches at both North and South Haven.

Salicornia disarticulata Moss and *S. appressa* Dum.—Sandy marsh at South Haven. Both confirmed by Dr. Moss.

Epipactis latifolia All.—A few plants near Durlstone Head. Hitherto recorded only for Creech Grange, in the Isle of Purbeck.

Juncus compressus Jacq.—A dwarf rush seemingly referable to this species grows with *J. Gerardi* Lois. in a few spots near Littlesea, and some intermediate individuals of possible hybrid origin were also observed. The plant does not match typical *J. compressus*, as its ripe capsules, while clearly exceeding the perianth-segments, are shorter and more globular; and it closely resembles a form collected by Mr. J. W. White at Berrow, Somerset, and described in Journ. Bot. 1889, 49. Buchenau reported Mr. White's plant to be intermediate between *J. compressus* and *J. Gerardi*, but it apparently finds no place in his monograph in Engler's *Botanischen Jahrbücher*, Band xii. p. 185 (1890), or in his subsequent works on *Juncus*, and would seem to be still an unnamed form. It is intended to deal further with this rush when fresh flowering material can be obtained. *J. compressus* has not been previously recorded for the Isle of Purbeck.

Deschampsia setacea Richter—Wet heath near Stoborough. New to the Isle of Purbeck.

MR. JOHN GILBERT BAKER.

A PLEASANT function took place at Kew on January 13, when an address of congratulation on the attainment of his eightieth birthday, signed by those who had been associated with him during his long connection with the Herbarium of the Royal Gardens, was presented to Mr. John Gilbert Baker, one of the oldest surviving contributors to this Journal, of which he was at one time assistant editor. The *Morning Post* of the following day published an account of an interview with Mr. Baker, from which we take the following autobiographical details:—

"I come of a family of yeomen farmers who were Quakers, and I was born at Guisborough, in Yorkshire, where my father was a general merchant. My earliest recollections are of the quiet little country town of Thirsk, to which my father removed his business when I was only six months old. At the age of nine I was sent to the Quaker school at Ackworth, where I remained for three years, at the end of which time I was transferred to another Quaker school, that of York. Among my schoolfellows at York were Joseph Rowntree, the founder of the well-known cocoa business, John Rowntree, his brother, Henry Seebohm, who became famous as an ethnologist [ornithologist], and two other brothers, George and Henry Brady, both of whom afterwards became Fellows of the Royal Society, a distinction which was conferred on myself as long ago as the year 1875. The Quaker school at York was a capital place. The discipline was mild, which was not the case, I believe, at most of the schools in my youthful days, and above all special attention was given to the natural science which soon became my delight. Of course, at the time of which I speak, that is to say early in Queen Victoria's reign, scientific study was not nearly so widespread as it is now. My school was the first to institute a Nature Study Society, and to this practically all the boys belonged. We used Babington's *Manual*, an excellent book of its kind, though costly according to present notions, and we used to go botanising in our leisure time in the fields round about the old Cathedral city. I entered into the pursuit with such enthusiasm that before I had been at the school twelve months I won a prize for the best collection of plants, and was thereupon made curator of our little herbarium. The Headmaster, Mr. John Ford, was not, so far as I am aware, specially devoted to scientific study, but several of the teachers were ardent botanists. I left school at the age of fourteen and went into my father's business, where I remained for eighteen years. During that time I was not wholly engrossed in commercial pursuits.

"All my spare time was employed in studying botany, and during this period of my career I wrote my book entitled *North Yorkshire: Studies of its Botany, Geology, Climate, and Physical Geography.* This was published by Messrs. Longmans, and a second edition was brought out in 1906 by the Yorkshire Naturalists' Union. Three years after this work was published I received a communication which changed the whole current of my life. It was a letter from Sir Joseph Hooker, who had recently been appointed Director of Kew Gardens in succession to his father, Sir William, and in it he offered me the post of First Assistant at the Herbarium under Professor Daniel Oliver. Sir

Joseph was at that time a stranger to me, and his communication came as a complete surprise. I need hardly say how thankfully I accepted his offer. That was the beginning of a long connection with the Gardens that has been to me a source of continual delight. Evenually, as you are probably aware, I succeeded Professor Oliver as Keeper. I had the privilege of assisting Sir Joseph Hooker with some of his scientific books. Sir Joseph was a man of unbounded energy, and, in my opinion, one of the greatest men of science who ever lived. He had been a great traveller, visiting the Antarctic region among other parts of the world in pursuit of his favourite studies. His father, Sir William, was of a more stay-at-home disposition, but he did great things for the Gardens, which, when he first went there, were in a state of absolute chaos. It had been a private garden of the Royal Family, and in the reigns of George IV. and William IV. had been greatly neglected. Sir William built three great houses, established communication with all the botanic gardens in the world, brought from Glasgow his herbarium and library, and, in short, made the place for the first time a thoroughly scientific institution. The good work has been well carried on by his successors, Sir Joseph Hooker, Sir W. Thiselton Dyer, and Sir David Prain. During Sir David Prain's comparatively short tenure of office he has built a beautiful series of tanks for hardy water-plants and bog and marsh plants, and has done a lot to the Rockery, while altering the walks in such a way as to give easier access to the temperate house and other points of interest. Sir William Hooker planned out a vast scheme under which all the plants of the British Dominions and dependencies, 50,000 in number, are to be made into a list. That scheme began with Australia, and is not yet finished, although the end is now in sight. The magnitude of the undertaking may be judged from the fact that in India alone there are 13,000 plants, more than are to be found in the whole of Europe. The fact is that in India you have a sort of variation in climatic conditions, from perpetual snow to extreme tropical heat. Africa is still to a large extent an unexplored region from the point of view of the botanist. The flora of the Cape has been completed, and in it are the names of 10,000 plants. In tropical Africa scarcely a day passes but a new plant is discovered. Mrs. Talbot has recently made a collection in Nigeria, which totals 10,000 genera and 200,000 species. Of these 15 of the former are new, as are 150 of the latter.

"The science of botany, I need hardly say, is a very different thing from what it was when I began my studies. Linnæus is quite out of date, although his system is still useful as a sort of index to plants, but in his day only about 10,000 plants were known in the entire world. The system of Linnæus is what is called the artificial system, and it was superseded by that of Jussieu, which is the natural system. The difference between the two would be best described by saying that that of Linnæus was a dictionary in which the different plants are given in alphabetical order, while that of Jussieu is a grammar in which they are arranged in groups. Jussieu's work was carried on by De Candolle, who classified according to the natural system all the plants known in his time. But when these eminent men wrote, geology can hardly be said to have existed, and our views of botanical science have been profoundly affected by the discovery of the law of evolution. No one now believes that there have been successive creations in the sixteen geological periods. With plants as with animals it has been a case throughout the world's history of the survival of the fittest. The teaching of botany in England was altered under the régime of Sir W. Thiselton Dyer, a great organiser. Before his time lecturers dwelt on the natural orders and external appearance of plants; now the German method is followed of studying the cells under the microscope and the physiology of plant life.

"Anything that would conduce to the welfare of Kew Gardens is of national interest, for it is by far the most important establishment of its kind in the wide world. In the Berlin Gardens they mount their plants on rockeries and group them roughly according to the different mountain systems to which they belong, and this is a very interesting plan. But the Berlin Gardens do not vie in importance with ours, which extend to 300 acres and are visited yearly by a million and a half of people. The existence of such a place for study reflects great credit upon our Government, which has not stinted the means of keeping it up. One of its best friends has been Mr. [Joseph] Chamberlain, who when he was in the Government obtained an extra grant, by means of which the great temperate house, one-eighth of a mile long, which had long remained unfinished, was completed. Mr. Chamberlain has always taken the greatest interest in the Gardens, which he used to visit regularly every year. I well remember those appearances of his, and the orchid which he invariably wore in his buttonhole. As you know, he is a great collector, and we often used to exchange plants with him. His collection of orchids at Highbury, Birmingham, is, I believe, worth £25,000. The great value of certain orchids consists in their rarity. As with other things, it is a question of supply and demand, and prices rise when they are sought after by wealthy collectors. The question of beauty is a subsidiary one. As a matter of fact you can buy some of the most beautiful specimens in existence for five shillings. I remember that we had a rare lily that was going to be photographed, but it was eaten up during the night by a cockroach. That cockroach did not know that his supper cost us something like £10."

BIBLIOGRAPHICAL NOTES.

LV*a*.—MIQUEL'S 'PLANTÆ JUNGHUHNIANÆ.'

SOME MS. notes in the copy of Miquel's unfinished *Plantæ Junghuhnianæ* in the library attached to the National Herbarium supply important corrections to Mr. Dunn's contribution in this

Journal for 1913 (p. 358). I have verified these notes, which may be tabulated as follows:—

Fasc. 1 = pp. 1–106; March, 1851	[*Flora*, 1851, p. 302, and Wikström, *Arsberätt.* 1851, p. 133 (1855).]
„ 2 = „ 107–270; 1852	[Wikström, *l. c.*]
„ 3 = „ 271–394; 1854	[Gramineæ (p. 341) bears date Febr. 1854; see also Wikstr. *op. cit.*, 1853–54, p. 125 (1856).]
„ 4 = „ 395–522; 1857	[Lichenes (p. 427) and Collemaceæ (p. 491) bear date Febr. 1856.]

The enumeration of the Hepaticæ, excerpted from vol. v. of *Verhandl. der K. Akademie Wettenschappen*, 1857, and included in fasc. 4, terminates abruptly. It was evidently intended to issue a completion of the work, for van den Bosch in vol. ix. of the work just cited ("Hymenophyllaceæ Javanicæ," 1861) and in *Nederl. Kruidk. Archief*, iv. ("Synopsis Hymenophyllacearum," 1859) quotes pp. 545–571 of "fasc. 5, *ined.*"

F. G. Wiltshear.

LVI.—"The Department of Botany."

The account of the Department of Botany occupies pp. 79–193 of the first volume of *The History of the Collections contained in the Natural History Departments of the British Museum* which was published in 1904. It is divided into three portions:—1. General Sketch (pp. 79–84); 2. Chronological Account of the Principal Accessions to the Botanical Collections to the end of 1902 (pp. 85–128); 3. Alphabetical List of the more important contributions to the Collection of Plants in the Department of Botany (pp. 129–193). It is stated in the Preface to the volume that the section was undertaken by "Mr. George Murray, assisted by Mr. Britten": Mr. Murray's name is appended to it at the foot of p. 193; and on p. 84 is a note: "Mr. Murray desires to state that advantage has been taken of Mr. Britten's unique knowledge of the history of the botanical collections. He, with Mr. Gepp's help, has completed the work."

How far this represents the facts of the case is sufficiently well known to those who were officially employed in the Department at the time of the preparation of the work; but it may be worth while to place these facts on permanent record. With the exception of the second section, which was transcribed from the records of accessions by Mr. F. G. Wiltshear, now in charge of the Departmental Library, the whole of the work was done by myself, with the help of Mr. Gepp in regard to the collections of Cryptogams. Mr. Murray's only part in the book was the addition of his autograph and the note quoted above, which was added, though not in the form that we had accepted as satisfactory, in consequence of representations made to him by Mr. Gepp and myself. Mr. Murray did not even read the proofs, although he officially passed them for press.

James Britten.

SHORT NOTES.

Romulea Columnæ.—It seems to have escaped the notice of British botanists, who now uniformly adopt it, and indeed of botanists generally, that, on the principle of priority, this name cannot stand. As the *Index Kewensis* correctly shows, it is synonymous with *Ixia parviflora* of Salisbury, who was the first to give it a specific name. Richter (Pl. Europ. i. 252 (1890)) cites Salisbury's name in his synonymy of *Romulea Columnæ*, quoting this latter from its first publication by Sebastiani and Mauri (Fl. Rom. Prodr. 18 (1818)). *Romulea parviflora* of Ecklon, cited in the *Index* (Top. Verz. 19 (1827)) is a *nomen nudum*, doubtfully referred by Mr. Baker (in Dyer, Fl. Cap. vi. 1, 42) to his var. *parviflora* of *R. rosea*, and therefore cannot stand. Salisbury's description is from a plant "sponte nascentem in Ins. Jersey, legit R. Finlay." Specimens from this collector, of whom I know nothing more—he was apparently the first to find the plant in the Channel Islands—are in Herb. Banks; the sheet was indorsed by Dryander: "Guernsey, on the sides of hills in dry places; in great quantity near Irwin's Redoubt. Jersey, near Grouville, in sandy places, Lieut. Finlay." Other specimens were sent from Jersey by Mr. Gosselin, and it was partly from the latter that the material was received upon which the figure in *English Botany* was based; a note by Sowerby on the plate, which is embodied in the printed text, explains the composite nature of the figure—"Flower from a root sent by Sir Joseph Banks, and grown by Mr. Anderson at Kensington; the remainder from a wild Guernsey specimen sent us dry by Mr. Gosselin." The full synonymy of the plant will be found in Richter (*l. c.*); in an abridged form it runs:

Romulea parviflora, comb. nov.
Ixia parviflora Salisb. Prodr. 34 (1796).
Ixia Bulbocodium Sm. E. Bot. 2549 (1813), non aliorum.
Romulea Columnæ Seb. & Maur. Fl. Rom. Prodr. 8 (1818) et auct. plur.
Trichonema Columnæ Reichenb. Fl. Excurs. 83 (1830).

It may be noted that both Richter and the Kew *Index* erroneously cite the E. Bot. reference as "*Trichonema Bulbocodium*," and that *Ixia Bulbocodium* Sm. finds no place in the latter.—James Britten.

The Adventitious Flora of a Library Court.—It may be of interest to record the following remarkable list of plants that were growing last summer in the back court of the University Library, Cambridge, all—with one exception—having originated from seeds that had been brought by wind or birds. In one small gravel-covered piece of ground, only nineteen feet square, in the south-west corner, with the buildings rising to a considerable height on two sides, there appeared no fewer than six species of *Epilobium* (*E. angustifolium*, *E. hirsutum*, *E. parviflorum*, *E. montanum*, *E. roseum* and *E. obscurum*), besides *Tilia vulgaris*, *Acer Pseudo-platanus*, *Potentilla reptans*, *Sambucus nigra*, *Betula* *alba*, *Ulmus glabra*, *Salix caprea*, *S. caprea* × (*cinerea* ?), *S. aurita* × *caprea*, *S.* (*aurita* ?) × *caprea*, *Taxus baccata* and *Asparagus maritimus*, whilst *Marchantia polymorpha* covered most of the bare places. There were no catkins on the willows, so the Rev. E. F. Linton, who saw them *in sitû*, could not with certainty name all of them. The Mulberry (*Morus nigra*) occurred in this same corner some years ago, but has been removed. On the gravelled border of other parts of the court were to be found *Ilex Aquifolium*, *Cratægus Oxyacantha*, *Betula alba*, *Salix caprea*, *S. cinerea* × (*aurita* ?), and *Asplenium Ruta-muraria* (growing from a joint in the wall). Most interesting were two plants of the sea-coast grass *Festuca rottbœllioides*, discovered by Mr. Jenkinson, the Librarian, and transplanted by him from Clare College, where numerous traces of it could still be seen in the autumn, though the authorities had done their best to destroy it by means of a weed-killer. Many of the above plants, unfortunately, were ruthlessly destroyed during the holidays by the too energetic gardener. The front court, too, has its interest for botanists. Most Cambridge men have noticed the ferns *Pteris aquilina*, *Lastrea Filix-mas*, *Asplenium Trichomanes*, and the beautiful tufts of *Asplenium Ruta-muraria*, that have for years grown, together with *Linaria Cymbalaria*, undisturbed, with their roots deep down in the cracks between the Senate House steps—"the best locality for ferns in Cambridgeshire!" All the ferns excepting *A. Trichomanes* occur elsewhere in the court. The list could be lengthened considerably if the names were given of the flowers that make the lawn gay in summer, when it has been left unmown for a short time. In the middle court the most conspicuous plants during the last year or two have been *Erigeron canadense* (in great abundance), *Epilobium montanum*, and *Linaria Cymbalaria*.—G. GOODE.

EUPHORBIA GIBRALTARICA (pp. 10, 13).—The attribution of this name to Mr. N. E. Brown is an error for which I am not responsible. Mr. Brown was good enough to help me in working out the species, but the ultimate naming and description are my own.—A. H. WOLLEY-DOD.

UTRICULARIA OCHROLEUCA.—To the list of counties on p. 10 should be added: "92. Aberdeen S. Dr. Trail sp."—ARTHUR BENNETT.

REVIEWS.

Biochemie der Pflanzen. By FRIEDRICH CZAPEK. Erster Band. Pp. xix. and 828. Jena: Fischer. 1913. Paper, 24 marks; cloth, 25.20 marks.

THAT the first edition of this work, published in 1905, in two volumes, containing 584 and 1025 pages respectively, supplied a generally felt demand is sufficiently indicated by the fact that it has long been out of print. In view of the enormous amount of work published during the last eight years in this extremely progressive branch of investigation, one is at first surprised that the present volume, the general arrangement of which remains much the same as in the first edition, has grown only by about 200 pages. However, a second glance shows that the author has now prepared what is practically a new book rather than a new edition. The explanation, apart from the author's unrivalled power of discrimination and compression, is simple. When Czapek's book first appeared, it was the most extensive work on biochemistry, but in the meantime there have been published numerous treatises dealing with every branch of the subject, including the great encyclopædia (*Biochemisches Handlexicon*) edited by Abderhalden, Wehmer's *Die Pflanzenstoffe*, and a host of smaller works, among which we may mention the fine series of Monographs on Biochemistry edited by Plimmer and Hopkins.

It is doubtless owing to the important technical applications of biochemistry that the publication of research papers has been so closely followed and accompanied by that of books summarising the results of these researches, with the result that perhaps in no other branch of science can one so readily keep in touch with the latest developments of the subject. Czapek's work, however, stands quite apart from all the others, for it is something more than, and something very different from, a mere encyclopædia of the chemistry of plant products. Indispensable though books of the latter class are, there is perhaps even greater need for a philosophical treatise on the chemical physiology of plants, and this is what Czapek has supplied in this new edition of the *Biochemie der Pflanzen*. Instead of merely expanding the book in order to include the results of work done in biochemistry of plants during the last eight years, Czapek has, by wholesale condensation and omission of material now available in other compilations and in special monographs, been able—without unduly enlarging his work—to give a critical summary of the progress made up to the present time in the direction of ascertaining the nature, relationships, and biological significance of the substances built up and broken down in the course of metabolism. Hence, this still bulky volume, packed with citations and serving as a guide to the extensive literature of the subject, is thoroughly readable, and presents a clear picture of the chemical aspects of plant physiology, which is only rendered the more complete and attractive by the wealth of detail introduced and fitted in place, the author never losing sight of the fundamental principles which the multitudinous details, if less skilfully handled, would tend to obscure rather than to illustrate.

The volume opens with a concise historical introduction, in which the author reviews the general progress of phytochemistry from the time of Aristotle onwards. The general section (pp. 20–239) contains a critical account of the present state of knowledge and opinion concerning colloids and colloidal phenomena, catalysis and enzyme action, immuno reactions, chemical stimulation, &c.—in short, of the whole of the remarkable body of facts and theories resulting from the application of modern physical chemistry to the problems of vital organization and metabolism. In concluding this section, in which the amazing progress of biochemistry is more strikingly reflected than in any other part of the book, the author considers the chemical aspects of heredity, variation, evolution, pointing out that in the light of the recent work of Keeble, Armstrong, and others, various colour varieties and mutants in flowers may be regarded as cases of "chemical mutation," and that many other morphological characters will doubtless be shown by future work to be the outward and visible signs of inner biochemical changes taking place in the cell.

The remainder of this volume is devoted to the carbohydrates (in the widest sense) and the lipoids (fats, waxes, phosphatides). It is impossible here to indicate, even by a bare enumeration of the chapter headings, the extraordinarily detailed and comprehensive nature of the author's treatment of these groups of substances in their various relations to each other and to metabolic processes. Many will doubtless be inclined to consider the amount of condensation to which these chapters have been subjected as somewhat ruthless, so much that appeared in the first edition having been excised altogether in order to make room for new matter based on recent investigations. In many cases, for instance, in the sections dealing with chlorophyll and allied substances, the older work—largely based on impure extracts—has very properly been omitted or relegated in severely condensed form to the valuable historical introductions which preface the main sections throughout the book. In other cases, however, one is inclined to wonder whether the author has not gone rather too far in his fixed determination to condense or omit material dealt with in other text-books, despite the fact that what the work has lost in encyclopædic fullness (and perhaps dullness) it has certainly gained in other directions. The outstanding feature of the work is the remarkable width of its range, the author having thoroughly ransacked the literature of pure and applied chemistry and botany in his brilliantly successful efforts to sort out and piece together a vast number of scattered observations which thus acquire a significance which would have escaped a writer less critical and less able to estimate relative values, while, on the other hand, a good deal of work which has formed the basis of uncritical and even extravagant theories is here dismissed with scant ceremony. Although the references to literature prior to 1905 have been greatly cut down, this volume contains some 6000 citations. It is almost incredible that any one author can have actually consulted every one of these thousands of books and papers. Hence, it is hardly surprising that one can detect a slight slip here and there. For instance, in the section dealing with light intensity and its measurement, a footnote reference is given, following the heading "Messende Methodik" (p. 534), to a paper by Wiesner (*Flora*, Band 105, p. 127), which certainly does not deal with methods of light measurement, though its title ("Ueber die Photometrie von Laubsprossen") might imply that it does.

F. C.

Index Kewensis Plantarum Phanerogamarum Supplementum Quartum Nomina et Synonyma omnium Generum et Specierum ab initio anni MDCCCCVI *usque ad finem anni* MDCCCCX *nonnulla etiam antea edita complectens ductu et consilio* D. PRAIN *confecerunt Herbarii Horti Regii Botanici Kewensis Curatores.* Oxonii e Prelo Clarendoniano [Nov.] 1913. 4to, cloth, pp. 1–252. Price £1 16*s*.

AMONG the many works which issue from the Kew Herbarium, it may be doubted whether any has proved of more universal usefulness to phanerogamic botanists at large than the "Kew Index," to adopt the title by which it is generally known. It is therefore with much satisfaction that we receive the Fourth Supplement, which brings the work down to the end of 1910, and which, considering the arduous nature of the undertaking, has been issued with reasonable promptitude.

In a prefatory note Sir David Prain indicates certain alterations which differentiate the present from the previous Supplements, as well as from the body of the work; this it may be well to reproduce:—

"Supplementum 4^{um} usque ad anni 1910 finem prolatum ita expolire maluimus ut magis botanices studiosis valuisset atque profecisset. Propositæ consulto ad eum præcipue adnotandæ sunt immutationes infra enunciatæ. Imprimis annum in quo nomina edita sunt semper designatum est. Iterum nomina antea usitata sub nomina nunc utenda recitata sunt; nominibus nudis inter synonyma enumeratis nomina accepta addita sunt. Nomina hibridarum arte operatorum neglеximus: denique, nomina iam locis ætate posterioribus perscripta et ex iis denuo memoravimus."

Small as these alterations are, they are distinctly improvements. The omission of dates of publication was, as we have more than once pointed out, one of the few oversights which detracted from the value of the *Index* and of its Supplements. We are glad, by the way, to note that these are given in the right place, *i. e.* at the end of the citation ("iv. 348 (1907)") instead of in the way frequently employed of late years ("iv. (1907) 348")—a method which possesses no advantages and which, in the case of most periodicals, is positively inaccurate and therefore misleading. It is doubtless convenient that references to readily accessible works should in many cases be added to those indicating place of first publication, but it may be hoped that this will not lead to quotations at secondhand, to which it seems somewhat to lend itself.

The citation of names already given after those now printed is presented in a new form: these are now preceded by a colon instead of by the sign "=," which in the original work was employed in more than one sense and was thus open to misunderstanding. All names are now printed in the same type; the use of italics for synonyms is discontinued. The names of garden hybrids, as to which in the *Index* there was some inconsistency, "some being abolished and others retained," are now entirely excluded: garden names, however, even when *nomina* *nuda*, seem to be thought deserving of a place: thus we have on the first page "Abutilon album, *Hort. ex Gentile Pl. Cult. Serres Jard. Bot. Brux.* 3 (1907) nomen.—Hab.?"—a sufficiently doubtful plant. Names omitted from the *Index* and from earlier Supplements are included; for a future Supplement it might be well to include a list of such names which will be found in the National Herbarium. The numerous still-born names published by Garsault in 1764 and 1767 are now included—a desirable addition in view of the fact that Gilibert's, many of which are on the same footing, found place in the *Index*. We note however that *Centaurium majus* (*Centaurea Centaurium* L.) is omitted—a somewhat important oversight, inasmuch as the association of this with *C. minus* (*Erythræa Centaurium* Pers.) has been cited as evidence that Garsault had no claims to botanical knowledge and that his names have no claim to recognition.*

It is of course only by use that the detailed accuracy of such a work can be tested, but so far as a necessarily casual inspection enables us to judge, this Fourth Supplement shows a great improvement on its predecessors. The new names published in this Journal, which have in former Supplements often been overlooked, seem, so far as we have tested them, to be duly recorded, the only omission we have noticed being, curiously enough, *Razumovia hispida*, to the omission of which from the Third Supplement we called attention when noticing that volume.† The work is singularly free from misprints—the only one we have noticed is in the third entry ("pe*n*dunculata")—and the references are very carefully done (Berger should replace Rendle as the authority for *Aloe paedogona*). We have thus little but praise for this Fourth Supplement: our only regret is that when alterations were being introduced, the insertion of a comma between name and authority should not have been abandoned, in accordance with general custom. And is it too much to hope that Mr. Jackson's long promised introduction to the work may be issued with the Supplement now in preparation?

The British Rust Fungi (*Uredinales*): *their Biology and Classification.* By W. B. Grove. Cambridge University Press. Pp. xii. + 412. 290 figs. in text. Price 14*s.* net.

The study of the Uredinales, the group of fungi known more popularly as "rusts," is one of the most fascinating in the whole realm of botany. It is only within comparatively recent times that some understanding has been arrived at with regard to their strange life-histories and their amazing niceties as concerns their particular host plants. One of the first systematic books (certainly the best, if regard be paid to the amount of original work contained therein) to take any account of the biology of the group was Plowright's *Monograph of the British Uredineæ and Usti-*

---

* See Journ. Bot. 1909, 322, where in line 5 from top "*majus*" should be "*minus*."

† Journ. Bot. 1908, 267.

laginecæ, reviewed in this Journal for 1889. Since that time no English book dealing with the rusts has appeared, and, considering the vast amount of research which has been done on the Continent during the past few years—much of which seems quite unknown to British mycologists—the present book, gathering up this work as it does, should prove a welcome addition to our mycological literature.

The first thing to strike one on perusing it is the very small amount of original work from the biological side: an occasional observation such as everyone must make is all that is recorded.

The book is divided into two parts: general and systematic. In the former the life-histories of typical Uredinales are described, giving an indication of the variation met with. Other matters considered are sexuality, the nature of the so-called spermatia, the nuclear life-history, alternation of generations, the spore forms and their groupings, specialisation, and immunity. A further chapter deals with classification and phylogeny. As this portion of the book consists of only eighty-four pages, the various accounts are necessarily much condensed. Room for a little expansion could have been obtained by a slightly different arrangement which would have saved a certain amount of repetition. Most of the recent work on the special points in this section has been considered. It is here naturally that there are differences of opinion. The evidence brought forward of fertilization by "Christman's method" in *Puccinia Caricis* is quite inadequate. The phylogenetic tree on p. 83, which places the Ascomycetes and the Basidiomycetes on one line of development and the Uredinales and Ustilaginales on another, will not be accepted by many mycologists who understand the questions which arise. The other points in these preliminary chapters call for no comment here save that they seem to have been on the whole fairly stated.

The classification adopted differs slightly from that proposed by Dietel in the Appendix to Engler & Prantl's *Pflanzenfamilien*, followed with minor modifications by the majority of recent authors, but *Endophyllum* is made the type of a family as in Dietel's first system. The order is divided into the Impedicellatæ; Melampsoraceæ, Cronartiaceæ, Coleosporiaceæ and Endophyllaceæ: and Pedicellatæ; Pucciniaceæ. The Melampsoraceæ are subdivided into Melampsoreæ and Hyalopsoreæ; Coleosporiaceæ into Coleosporieæ, Ochropsoreæ, and Zaghouanieæ, and Pucciniaceæ into Puccinieæ, Phragmidieæ, and Gymnosporangieæ, subfamilies proposed at different times by various authors. A generic key is given. In the body of the book the families are taken in the reverse order from that in which they appear in the classification and in the generic key, for which there seems no reason. The author tells us in his preface that the specific descriptions are based upon those of the *Monographia Uredinearum* of the brothers Sydow. "Those of all the species of which British specimens could be procured have been carefully revised, and there is hardly one of them that has not been added to or amended. Fischer's *Uredineen* *der Schweiz* and McAlpine's *Rusts of Australia* have also been found extremely useful"—the former, we should say, particularly so.

Following the example of recent works line drawings of certain spore forms, usually the teleutospore, are given in most cases. A list of synonyms is given, but there is no attempt at completeness and very few dates are added. It would have been a great advantage to students to have dates in all cases. To confirm dates is a very heavy task, but when an author has really looked up all the references, it gives but little trouble to add the date, and in doing so he greatly helps those who have not access to a large botanical library. Very useful notes are appended to the descriptions, giving accounts of recent studies. It is in the gathering together of these scattered facts that the book will prove most useful. Annual critical *résumés* of such work appear in certain journals, but its relation to systematic mycology is often overlooked. The host plant, relative frequency, date, locality and universal distribution are usually all given. Where spore forms have not been observed in this country they are described within square brackets (except in the case of the interesting genus *Milesina*). It would seem, however, that we may be accepting very many statements from observers in different countries with insufficient reservation since "as is now known, the life-histories of such heterœcious forms require to be worked out for each country separately." For instance, it seems unsafe to join up the aecidiospores and teleutospores of *Cronartium Quercinum* described from American specimens when only the uredospores have been found in this country, and "their dimensions are smaller" than in America.

The author does not go as far as many with regard to the much named "biological species" and quotes with gusto the rather notorious case where Probst showed that one such species was confined to a form of a variety of a subspecies. It would seem that all the recently proposed genera of the old world have been adopted. There is still some uncertainty as to some of these genera. For example, for the old *Chrysomyxa albida* a new genus *Kühneola* was proposed by Magnus. Into this genus Arthur put *Phragmidium Tormentillæ* and in this is followed by Mr. Grove. This same species, however, was placed by Magnus himself in the genus *Xenodochus* and this is accepted by Klebahn. A way out of the difficulty on the present lines would seem to be to make a third monotypic genus. A totally different proposition meets one in the case of the genus *Puccinia*, where in the present work 137 species are described. As no scientific arrangement of these has yet been proposed, Sydow's method of classifying them according to the host plant is adopted. Certain conceptions of the author as to what must be regarded as species seem rather open to criticism. The suggestion that *Triphragmium Filipendulæ* should be lumped with *T. Ulmariæ* is one that will not be followed without the proof of inoculation experiments. The nomenclature is according to the International Rules (Brussels Congress, 1910) but in certain cases, e. g. *Phragmidium disciflorum*, there seems to have been a slight misunderstanding as to what those Rules entail. A useful index of host plants, one of the species, a list of excluded species, a glossary, and a bibliography—not so complete as one would wish—complete the volume. The name of the publishers is sufficient guarantee of attractive printing and binding. The line drawings (there are also a few wash drawings) are clear. Mr. Grove has compiled a book, reasonable in price, which must be in the hands of all British mycologists.

J. Ramsbottom.

Gruppenweise Artbildung. By Hugo de Vries. 8vo, pp. viii. 365, with 121 figs. and 22 coloured plates. Borntraeger, Berlin. 1913. Price 22 Marks.

More than ten years ago in his *Mutations-Theorie* De Vries endeavoured to show that the production of new species was, like any other physiological process, a matter for experiment. Much work has been done on the subject since then by De Vries himself, Dr. R. Gates, and others, especially in relation to the genus *Œnothera*, investigations on which played so important a part in De Vries's original memoir. The present remarkably well-illustrated volume details the results of a large number of experimental crossings between species and forms of *Œnothera* and the relation of these results to the author's theory of the origin of species by mutation.

The text is divided into five sections. The first, entitled "The Origin of Species through Mutation," is an exposition of the author's views on mutations in the light of his theory of intracellular pangenesis. The pangens are contained in the nucleus, and have each their special character. Their condition varies, and may be active, inactive, or labile, and the last-named state is the cause of the conditions requisite for mutability. Section ii. deals with "Reciprocal and Double-reciprocal Hybrids." The author points out that the products of reciprocal crosses are very often unlike, indicating that the characters contained in the pollen differ from those in the egg-cell. Such species De Vries terms heterogamous in contrast with isogamous species, in which pollen grain and egg-cell bear the same characters. By the process of *gamolysis*—that is, the determination of these special characters by crossing—De Vries seeks to analyse the constitution of numerous natural species as well as mutants. Sections iii. and iv. are respectively headed "Twin-hybrids" and "The Pangenetic Investigation of New Species," and Section v. is a general discussion on the "Causes of Mutation." Appended are a bibliography of the literature of the subject since 1903 and a systematic list of the crossings in the genus *Œnothera* which are described in the text.

The book is an important contribution to the study of genetics; and not the least useful features are the series of photographic blocks with which the text is illustrated and the well-executed coloured plates at the end of the volume.

A. B. R.

BOOK-NOTES, NEWS, &c.

Mr. Cedric Bucknall publishes in the *Journal of the Linnean Society* (xli. No. 284; December 29) a "Revision of *Symphytum*," which, as will be expected by those who read his paper on some hybrids of the genus published in this Journal for 1912 (pp. 332–337), is evidently a very careful piece of work. He recognises twenty-five species: one of them—discovered by Shuttleworth at Hyères in 1871, and distributed by him as *S. floribundum*—is now first described; other new species are *S. armeniacum* and *S. Bornmuelleri.* The species which have been found in Britain as introductions are *S. asperum*, *S. peregrinum*, *S. tauricum*, *S. caucasicum*, and *S. orientale*; the confusion associated with the name *asperrimum*, which has been applied to at least seven species, has been unravelled. The history of the genus is fully detailed; there is a very full synonymy, including that of pre-Linnean authors, and a full list is given under each species of the specimens examined, and—perhaps a little redundantly—the names under which they appear in the herbaria consulted. The descriptions throughout are very full and show much personal investigation: the paper is, in fact, a model monograph, and Mr. Bucknall is to be congratulated on the result of his many years' work.

Notwithstanding the plenitude of botanical literature, comprehensive works of reference on the various branches of the science are all too scarce, and much time is wasted and information overlooked in consequence. The *Bradley Bibliography*, which is being issued under the able direction of Prof. C. S. Sargent as Publication No. 3 of the Arnold Arboretum, is a welcome addition to this class of works. It is to be "a guide to the literature of the woody plants of the world, published before the beginning of the twentieth century," complete in five quarto volumes. Two of these, dealing with dendrology, have already appeared; the first "includes all botanical publications containing references to woody plants, except those which are restricted to a particular family, genus, or species, which are found in the second volume and are arranged according to the system of Engler & Prantl," and in chronological sequence under each subject. The third volume will be occupied with literature on the economic products and uses of woody plants and with arboriculture; the fourth with forestry, and the last with an index to the whole. Dr. A. Rehder, who has had this work in preparation for upwards of ten years, made a tour of the principal botanical libraries in Europe and America in his endeavour to render the enumeration as thorough as possible. Each title is given at ample length and followed by particulars of size, date and place of publication; occasional annotations also add to the value of the entries. The volumes are of convenient *format*, and their fine typography is worthy of the Riverside Press from which they issue. The expense connected with the production of this work, which has been made possible by a family gift commemorative of William Lambert Bradley, must have been considerable, and is reflected in its cost, $100, or nearly £21.—F. G. W.

A LONG and interesting account of William Gardiner (1808–1848), contributed by Mr. Alexander P. Stevenson to the recent part (xxvi. pt. 2) of *The Transactions of the Botanical Society of Edinburgh*, contains a note reprinted from Gardiner's *Botanist's Repository* which may throw some light on the difficulties attending the verification of George Don's discoveries: The innkeeper at Auchmithie, hearing Don's name mentioned, "pronounced a warm invective against that gentleman, who, he observed, had ruined these trees, for since he had been prowling about there, not a plant worthy of notice was to be seen. I had no reason to doubt mine host's assertion, for I have frequently searched Mr. Don's habitats in vain. I verily believe his plan respecting rare plants was—first to dig up all the specimens he could see, and then note the locality."

THE Second Circular of the International Botanical Congress for next year, issued last month, contains the "program of work" for the Congress, which was defined by the Congress of 1910 as follows:—

"1. To fix the starting-point for the nomenclature of (*a*) Schizomycetes (Bacteria); (*b*) Schizophyceæ (excepting Nostocaceæ; (*c*) Flagellatæ; (*d*) Bacillariaceæ (Diatomaceæ).

"2. To compile lists of *nomina generica utique conservanda* for (*a*) Schizomycetes; (*b*) Algæ (incl. Schizophyceæ, Flagellatæ, &c.); new lists for groups not included in the list of 1910 and also a supplementary list; (*c*) Fungi; (*d*) Lichens; (*e*) Bryophyta.

"3. Compilation of a double list of *nomina generica utique conservanda* for the use of palæobotanists.

"4. Discussion of motions relating to *new points* which were not settled by the Rules adopted at Vienna in 1905 and at Brussels in 1910."

The English members of the various committees for the consideration of these points are—for Mosses, Mr. Antony Gepp; for Algæ, Mr. Gepp and Mr. A. D. Cotton; for palæobotany, Dr. Arber, Dr. D. H. Scott, and Prof. Seward. Copies of the Circular, which defines the functions of the various Committees, may be obtained from the General Secretary, Dr. Rendle, to whom inquiries regarding the Congress may be addressed. Dr. Rendle is also a member of the Editorial Committee, "functioning as a Permanent Bureau of Nomenclature."

THE new edition of the *Biographical Index of British and Irish Botanists* is practically ready for press, and it is hoped that it may be printed before the end of the year. The attention of our readers may be called to the list of little-known British botanists which was printed in this Journal for 1912 (pp. 61, 130, 194) in the hope that further information might be forthcoming concerning those whose names appear therein. That hope has received but slight fulfilment, and we once more call attention to the list in case there should be some who have not yet forwarded the information they may possess. This should be sent to Mr. Britten, 41 Boston Road, Brentford, Middlesex, who will also be glad to send a copy of the list to any who may not possess it.

NOTES ON BRITISH PLANTS.

By C. E. Moss, D.Sc., F.L.S.

I. Sagina saginoïdes.

This species has come into some prominence recently owing to a discovery—or perhaps I should say a rediscovery—on Ben Lawers by the members of the International Phytogeographical Excursion, led by Mr. A. G. Tansley, in August, 1911. The particular *Sagina* which was then found and discussed has since been named *S. scotica* by one of the members of the party (Mr. G. C. Druce in Bot. Exch. Club. Brit. Rep. for 1911, iii. 14, 1912), and regarded as a hybrid of *S. procumbens* and *S. saginoïdes* by two other members of the party (Dr. C. H. Ostenfeld in New. Phyt. xi. 117, 1912; Professor C. A. M. Lindman in Bot. Not. 267, 1913). So far as I understand the position of Ostenfeld and Lindman, these botanists regard the plant as a fixed and sterile hybrid, which originated long ago, and which has since continued to reproduce and spread itself by vegetative means. My own view of the plant is that it is a variety of *S. saginoïdes*.

If Druce (in Journ. Bot. 1913, 91) is correct in identifying a specimen of Robert Brown's as belonging to the disputed plant, then this is the earliest specimen known. I am not, however, very happy with regard to this determination. The specimen clearly belongs to the species *S. saginoïdes*, as I regard it; but Brown describes his plant as "decandris" and "pentagynis"; and one of the capsules of the specimen is nearly twice as long as the calyx. However, Druce is doubtless able to identify *S. scotica*. There is no date or locality on Brown's label; but another specimen of *S. saginoïdes* on the same sheet was collected by Brown on Ben Lawers in 1794. The label of the plant mentioned by Druce contains a MS. description and a MS. name; and the latter is, in my opinion, a MS. synonym of *S. saginoïdes*.

I am assured that the disputed plant has for many years been definitely known to many Scottish botanists, and that these did not regard it as sufficiently different from *S. saginoïdes* to merit a special name.

Lindman (*op. cit.*) gives some interesting details as to the history of the disputed plant in Scandinavia; and the present note emphasises the fact that it was clearly known to Reichenbach over seventy years ago, and known more or less clearly to several other Central European botanists in more recent years. It is not a rare plant in herbaria, where it is sometimes named *S. procumbens*, but usually *S. saginoïdes*.

Whilst the disputed *Sagina* was being discussed on Ben Lawers by the members of the International Phytogeographical Excursion, I dug up two sods of the plant. One of these I forwarded to Mr. E. W. Hunnybun, who drew the specimen for volume iii. of the *Cambridge British Flora*; and the other I forwarded to Cambridge to be grown in my garden. Here it has flourished; and I have also been fortunate in successfully growing specimens of the larger form of *S. saginoïdes* from the same locality. Hence I have had excellent opportunities of comparing the one with the other, and both with the allied species *S. procumbens*.

In my opinion, the disputed *Sagina* has neither the appearance, nor the characters, nor the general behaviour of a hybrid. It is, in its essential features, constant over a very vast area in the northern hemisphere: in Scotland, it grows on several mountains in situations where its alleged parents are absent: the characters of the plant remain constant in cultivation: its pollen is normal: it produces, in abundance, plump capsules filled with good seeds; and there is, so far as I can judge, no evidence of any factorial segregation. Under all these circumstances, I prefer to await the results of actual experiments before accepting the hypothesis, so ably maintained by Ostenfeld and Lindman, that the plant is of hybrid origin.

As great emphasis has been placed upon the alleged infertility of the disputed plant, I repeat that in my garden it produced good seed freely throughout the summers of 1912 and 1913. In 1912, I sent samples of this seed to Druce and Ostenfeld. In early September, 1913, the Rev. E. S. Marshall and I visited Ben Lawers, and found that the little *Sagina* was quite fertile in its native haunts. Professor P. Graebner also states (*fide* Druce in Journ. Bot., *loc. cit.*) that the plant is fertile in the Botanic Garden at Berlin. I suggest that the apparent sterility of many herbarium specimens of this plant is due to their immaturity, and to their having been collected too early.* This explanation is more especially likely to be correct when the "barren" herbarium specimens possess tetramerous flowers, for, as is shown later on, such flowers are common in the disputed plant in its early flowering stage.

It is true that the disputed plant propagates itself very readily by vegetative means; but all the British perennial members of the genus reproduce themselves more or less freely and effectively in what is essentially the same manner.

The disputed plant is a little nearer *S. procumbens* than its ally, though it will be generally admitted that this fact does not demand the hypothesis of hybridity.

A statement that the capsules of the disputed plant ("*S. scotica* Druce") are larger than those of its near ally ("*S. saginoïdes* L.") is due to an accidental inversion of the names of the two plants (*vide* Journ. Bot. 142, 1913).

The first published account of the two plants was given by Reichenbach in his Icones Fl. Germ. et Helv. vol. v. (1841). Here both plants were named and figured. Reichenbach placed them both in his genus *Spergella*, a genus, I may add, which is rightly reduced to *Sagina* by all modern botanists. The disputed plant was there named *Spergella saginoïdes*, its larger ally *Spergella macrocarpa*. I do not detect the slightest confusion here. Reichenbach, it seems to me, chose to regard the smaller of the two plants as the Linnæan type of the species; and the larger plant he separated from it as a distinct species. The only difference here between Reichenbach and some other botanists is that Reichenbach regarded the smaller plant as the Linnæan type, and others have so regarded the larger plant. There is nothing in the original Linnæan description to enable anyone to decide which of the two plants is really the Linnæan type: the specimen in the Linnæan herbarium, whilst certainly belonging to the species *S. saginoïdes* as I understand it, is too young and too incomplete for me to state to which of the two forms it should be referred; and therefore it seems to be essentially a case where the choice of the first author who separated the plants is binding. Some authors later than Reichenbach have perhaps confused the issue by assuming that *Spergella macrocarpa* Reichenb. was a larger plant than any described form of *Sagina saginoïdes*; and perhaps this supposititious plant is the var. *macrocarpa* or the *Sagina macrocarpa* of some botanists. This, however, does not apply to all botanists who have taken up Reichenbach's names; and even if it did, it would not invalidate Reichenbach's unequivocal view of the case. Beck (Fl. Nied. Öst. 358, 1890) is perfectly clear about the matter, for his var. *macrocarpa* is definitely *Spergella macrocarpa* Reichenb., and his var. *typica* is, by description, *Spergella saginoïdes* Reichenb. In thus reducing Reichenbach's two species to varietal rank, Beck has in my judgment correctly assessed the relationship of the two forms.

---

* A parallel case may here be mentioned. *Salicornia fruticosa* L. is very rarely found with ripe seeds on herbarium sheets: the seeds are not ripe until late October or November, when few collectors are at work. On the other hand, ripe seeds of *S. glauca* Del. are very common in herbaria: this species ripens its seeds nearly two months earlier than *S. fruticosa*, and at a time therefore when plant collectors are busy.

Brügger (in Jahresber. Naturf. Granbünd, xxiii.–xxiv. 71, 1881) has recorded a plant from the Bernina district of Switzerland as "*Sagina saxatilis* × *procumbens*," adding in brackets after a short description and note "(*S. media* Brgg.)." The description given by Brügger is not a very satisfactory one; and the only specimen so named in Brügger's herbarium at Chur is, as stated by Lindman (*op. cit.*), neither the disputed *Sagina* nor any other form of *S. saginoïdes*. Lindman's words (p. 273) are:—"Dr. Thellung has noted on the label [of Brügger's plant] that it is a common [form of] *S. procumbens* with some pentamerous flowers," and adds that he, Lindman, finds Thellung's identification to be "quite correct." However, from the evidence of unnamed specimens among Brügger's plants named *S. procumbens*, Lindman believes (p. 274) that "there is in Brügger's herbarium quite sufficient material of a '*Sagina media*'"; and he accordingly adopts Brügger's name for the disputed *Sagina*. This name, I think, should be cited as "× *S. media* Brügger emend. Lindman."

Wohlfarth (in Koch's Syn. ed. 3, i. 268, 1892) divides *Sagina saginoïdes* (sub nom. *S. linnæi**) into (*a*) var. *micrantha* and (*b*) var. *decandra*: these varieties date back to Ledebour's Fl. Ross. i. 339 (1842). So far as I can judge, the var. *decandra* is *S. saginoïdes* as understood in the present communication; and the var. *micrantha* (= *Spergula micrantha* Ledebour Fl. Alt. ii. 183, 1830) is a plant unknown to me.

---

* The point of view which I adopt with regard to the use of small letters for trivial names was stated in this Journal for 1913, p. 21.

Lagerheim (in Kgl. Norske Vidensk Selsk Skr. for 1898, no. 1, 4, 1898) found the disputed *Sagina* (i.e., *S. saginoïdes* var. *typica* Beck) in Scandinavia, and stated his view that the plant is a hybrid of *S. procumbens* and *S. saginoïdes*: Lagerheim's name may therefore be written × *S. normanniana*; and this name is not open to the objection—an objection which applies to the name × *S. media*—that the author gave an inferior description and perhaps mixed or confused his own specimens of his own plant.

It is worth noting that Swartz (in K. Vetensk. Acad. Handl. 44, t. 1, fig. 2, 1789) describes his *Spergula saginoïdes* as possessing only five stamens. Smith draws attention to this statement—exemplified also in Swartz's figure—when describing his own plant and figure (Eng. Bot. ed. 1, t. 2105), and adds that whether his (Smith's) plant is Swartz's or not it is certainly Linné's. As Presl cites Smith's figure when founding his *Sagina linnæi*, we have, in this remark of Smith's, the origin of Presl's trivial name.

In all the specimens of *Sagina saginoïdes* which I have observed, including both the forms here discussed, the stamens have been $n + n$, where n is four or five; and Presl correctly gives the number of the stamens of the species as eight or ten. I do not doubt that Presl deliberately included both forms of the species in his *S. linnæi*, for tetramerous flowers in the larger form are quite rare. It is also fair to say that Smith also included both forms in his *Spergula saginoïdes*, for both forms are so named in his herbarium.

From the point of view, then, adopted in the present paper, the following citations are set out:—

SAGINA SAGINOÏDES Dalla Torre Anleit. Beob. Alpenpfl. 75, in Hartinger's Atlas der Alpenfl. (1882) incl. *Sagina macrocarpa*; Britton in Mem. Torr. Club. v. 151 (1894); *Spergula saginoïdes* L. Sp. Pl. 441 (1753)!; Smith Fl. Brit. 504 (1800)!; *Sagina linnæi* C. B. Presl Rel. Haenk. ii. 14 (1831); *Sagina saxatilis* Wimmer Fl. Schles. 75 (1841).

(*a*) S. SAGINOÏDES var. MACROCARPA Beck Fl. Nied.-Öst. 358 (1890); *Spergella macrocarpa* Reichenbach Icon. v., 26, fig. 4963*b*, (1841); *Sagina macrocarpa* Maly Enum. Pl. Austr. 293 (1848); *Sagina saxatilis* var. *macrocarpa* Hausmann Fl. Tirol. 133 (1854).

Icones:—Eng. Bot. ed. 1, t. 2105, as *Spergula saginoïdes*; Fl. Dan. t. 1577, as *Spergula saginoïdes*; Svensk Bot. t. 765, as *Spergula saginoïdes*; Reichenbach Icon. v. t. 202, fig. 4963*b*, as *Spergella macrocarpa*.

Exsiccata:—Billot, 1423 (partim), as *Sagina linnæi*; Fellman, 42, as *Arenaria biflora* (corrected to *S. saxatilis*); Fries, ix. 40, as *S. saxatilis*.

(*b*) S. SAGINOÏDES var. TYPICA Beck *loc. cit.*; *Spergella saginoïdes* Reichenbach *loc. cit.* t. 4962; × *Sagina normanniana*

Lagerheim *loc. cit.*; *S. glabra* var. *scotica* Druce in New Phyt. x. 325 (1911)!; *S. scotica* Druce in Bot. Exch. Club Brit. Rep. for 1911, iii. 14 (1912)!; *S. procumbens* × *saginoïdes* Ostenfeld in New Phyt. xi. 117 (1912)!, ? excl. syn. Brügger; Lindman in Bot. Notiser. 267, et fig. (1913)!, ? excl. syn. Brügger; × *S. media* Brügger [*loc. cit.*] emend. Lindman *op. cit.* p. 273.

Icones:—Reichenbach *op. cit.* t. 4962, as *Spergella saginoïdes.*

Exsiccata:—Billot, 1423 (partim), as *Sagina linnæi*; Reichenbach, 1095, as *Spergella saginoïdes*; Schultz et Winter, i. 21, as *Sagina linnæi.*

In citing Billot's No. 1423 (as exemplified in Herb. Univ. Cantab.) under both varieties, I am casting no reflection on his perspicacity. I think it is quite probable that he deliberately intended in these specimens to indicate his view of the species *Sagina saginoïdes*; and, if this is really so, it only remains for me to add that I follow Billot (as well as Smith and Beck and probably Presl) in my concept of the species in question.

The distinguishing characters of the two British varieties of *Sagina saginoïdes* are tabulated below. These characters are taken from fresh specimens grown in my garden originally from Ben Lawers, from fresh material growing on the same mountain, and from Lindman's excellent description (*op. cit.*). It is well to add that, as yet, cultivation of my own garden specimens has induced no alteration worth mentioning in the characters of either variety, and that Lindman (p. 272) seems to have detected no differences in Scandinavian material which had been in cultivation for fifteen years.

	S. saginoïdes var. *typica*.	*S. saginoïdes* var. *macrocarpa*.
Habit	Less robust and more straggling. Vegetative propagation by axillary buds or shoots more pronounced.	More robust and less straggling. Vegetative propagation less pronounced.
Barren rosettes	More numerous, but individually smaller. Leaves shorter (up to about 1·8–2·0 cm. long).	Less numerous, but individually larger. Leaves longer (up to about 2·5 cm. long).
Pedicels	More slender.	Less slender.
Flowers	First flowers mostly tetramerous. Later flowers mostly pentamerous. Latest flowers mostly tetramerous.*	Usually pentamerous, very rarely tetramerous.*

---

* In this connection, it should be mentioned that *S. procumbens* is sometimes pentamerous even when growing in lowland localities where any form of *S. saginoïdes* is unknown.

	S. saginoïdes var. *typica.*	*S. saginoïdes* var. *macrocarpa.*
Sepals	On the average, about 1·3 mm. long and 2·3 broad.	On the average, about 1·6 mm. long and 2·25 broad.
	Occasionally spreading in fruit, often erect (or suberect).	Usually erect (or suberect) in fruit, rarely spreading.
Petals	On the average, about 1·0 mm. long and 1·5 broad.[*]	On the average, about 1·5 mm. long and 2·0 broad.[*]
Capsules	On the average, about 3–5 mm. long, and about 1·1–1·3 times as long as the calyx.	On the average, about 5–8 mm. long, and about 1·3–1·9 times as long as the calyx.

I feel that it cannot be successfully maintained that the characters tabulated above are of sufficient importance to justify botanists in regarding the two plants as specifically distinct. It will be noticed that the differences are either comparative or refer to matters of mere number and size. I find that, when large numbers of specimens of the two plants are compared, the actual discontinuity between the two varieties is trifling, though I admit that with patient examination it is possible to determine precisely almost any complete and mature specimen whether living or dried. Further, if Druce is correct in identifying Robert Brown's plant, alluded to earlier on in this paper, as *S. saginoïdes* var. *typica* (i. e., *S. scotica* Druce), then there is not merely an absence of discontinuity in the important character of the size of the capsule, but there is actually a considerable amount of overlapping.

S. saginoïdes, in each of its British forms, may be distinguished from the allied *S. procumbens* by its more robust habit, its larger leaves which are scarcely mucronate, its usually longer pedicels, its more frequently pentamerous flowers, its larger petals, its larger capsules, its usually erect (or suberect) fruiting sepals, and its much greater abundance in sub-alpine and truly alpine localities, usually in wet situations. From the allied *S. subulata* it may be distinguished by its being totally glabrous and eglandular, by the much less pronounced apical mucronation of the leaves, and by its smaller flowers and capsules. It has to be confessed, however, that "species" in this genus have been made exceedingly small, and that reduction in other parts of the genus is desirable; for example, are not *S. ciliata* and even *S. reuteri* too closely allied to *S. apetala* to be allowed to remain as separate species?

The two varieties of *S. saginoïdes* can scarcely be said to grow in distinctive habitats. In Scotland, both occur in and near sub-alpine and alpine streamlets and springs. The var. *typica* tends to spread from the springs and streamsides on to the surrounding siliceous grassland, and even on to small hillside *lägers*, more than does the var. *macrocarpa*; but the two often occur side by side in the wetter situations. The var. *typica* descends to lower altitudes (ca. 550 m.), and the var. *macrocarpa* to higher altitudes (ca. 1320 m.); but the stations overlap a great deal.* The latitudinal range of the two varieties is practically identical, as the var. *typica* occurs in Iceland, Scandinavia, Central Europe, Asia, North America, and Greenland, as well as in Scotland (see Lindman *op. cit.*).

---

[*] Petals are frequently present in *S. procumbens*, but are not more than half as long as the sepals.

As to the respective names the plants should bear if they are regarded (erroneously regarded, as I think) as different species, I submit that Reichenbach's names have not, in recent discussions, received due recognition. The trivial names of Reichenbach are legally correct: he was the first author to name the two plants as separate species: his figures are less faulty than those of his predecessors: there is nothing in the original description to invalidate his choice of the type: there is no doubt or ambiguity or confusion regarding the identity of his plants: later authors, including such an eminent systematist as Beck von Mannagetta (*loc. cit.*), have accepted his names; and hence I can see no valid objection whatever (supposing the two plants are regarded as different species) against the names *Sagina macrocarpa* (Maly, *op. cit.*) for the larger plant and *Sagina saginoïdes* (Linn. sub nomine *Spergula*, emend. Reichenbach sub nom. *Spergella*) for the smaller plant. If it be contended that the name *Sagina saginoïdes* has under the new circumstances become a *nomen confusum*, then I think the name *S. scotica* (Druce, *loc. cit.*) holds the field; but I should not agree to the rejection of a Linnæan trivial name where the confusion is so slight as in this case. If, indeed, such a contention were upheld, how many Linnæan names, either generic or specific, would remain valid?

Whilst discussing this nomenclatorial matter, one may perhaps be pardoned for alluding to the form of such names as *Sagina saginoïdes*. By the International Rules, one has to reject such names as *Castanea Castanea*; but it must be admitted that names of the latter form, whilst doubtless objectionable from some points of view, are less nonsensical than such names as *Sagina saginoïdes* and *Cerastium cerastioïdes*.

The actual outcome of the whole discussion is that two very closely allied plants, properly distinguished and figured by Reichenbach more than seventy years ago, have been brought into prominence, and their characters and distribution worked out in some detail. It is also clear that, even with precisely the same critical plants before them, systematic botanists cannot always agree as to the characters, the nature, and the status which these plants actually possess; and until agreement has been reached regarding the status or rank of a plant, it is, in the nature of the case, quite impossible to attain unanimity with regard to the name it shall bear.

---

* *S. procumbens* is recorded by White (Fl. Perthshire, p. 86) up to 1000 m.; but all these higher altitudes attributed to *S. procumbens* now need revision, as this species has been confused with *S. saginoïdes* var. *typica*.

THE MUSSÆNDAS OF MADAGASCAR.

By H. F. Wernham, B.Sc.
(Department of Botany, British Museum.)

In a recent paper (Journ. Bot. 1913, p. 233) I pointed out the possible significance of the relative size of the limb and tube of the corolla in the genus *Mussænda*. In the case of species with one of the calyx-lobes developed as a foliar attractive organ, the limb is rélatively insignificant. In the case of the *Mussænda* species found in Madagascar and the Mascarenes—all endemic save one (*M. arcuata*)—the corolla-limb is relatively large, and the calyx-lobes subequal (§ *Landia*), none being amplified into the foliar organ characteristic of, e. g., *M. luteola*.

M. elegans is the only continental African species known in which the corolla-limb is amply developed and the calyx-lobes invariably subequal; and it is thus worthy of note that the two conditions of the corolla-limb in question are in significant correspondence with two respective areas of distribution, *viz.*, continental Africa and the islands in question. A further interesting point in the same connection is the fact that *M. arcuata*, which is transitional from the aspect of the corolla-limb and the calyx-lobe development (Journ. Bot. 1913, p. 233), occurs widely in both the areas named.

Again, all the species now concerned appear to be erect in habit, either shrubs or trees, with the exception of *M. arcuata*.

All the eighteen species dealt with in the present paper are endemic in Madagascar, with four exceptions, namely, *M. arcuata* Poir., just mentioned, which occurs in Mauritius and Bourbon, as well as in Madagascar; *M. mauritiensis* (p. 66) and *M. Stadmannii* Michx. (p. 66), confined to Mauritius; and *M. Landia* Poir., ex hb. Justice Blackburn, the locality of which is in doubt, but probably Mauritius.

Key to the Species.

Plants glabrous, or almost so, including the flowers; corolla-tube, 2·5 cm. long at most, usually much less, occasionally puberulous externally along 5 obscure ridges .... 1. *arcuata*.
Plants not glabrous. Corolla-tube over 3 cm. at least, usually over 4 cm., never glabrous.
Pubescence on principal leaf-veins adpressed, or mostly so.
Calyx-lobes ± rigid, appreciably broad, not subsetaceous.
Leaves not glabrous above.
Leaves not oblanceolate (except in *M. asperula*); ± rough above with very short hairs, usually much over 10 cm. long.
Leaves broadly oval, shortly acuminate at most, barely twice as long as broad.
Corolla-tube about four times as long as lobes 2. *trichophlebia*.
Corolla-tube less than three times as long as lobes.
Calyx-lobes linear, mostly upwards of 1 cm. long 4. *Stadmannii*.

Calyx-lobes ovate-lanceolate, barely 5 mm. long usually .... 3. *Landia.*
Leaves long-acuminate, mostly over three times as long as broad .... 5. *mauritiensis.*
Leaves rather small, mostly broadly oblanceolate, about two and a half times as long as broad 6. *asperula.*
Leaves oblanceolate, sparsely pilose above with longish red hairs, barely 5 cm. at longest .... 11. *ramosissima.*
Leaves glabrous above, or punctate, except for obscure, closely adpressed pubescence on veins.
Corolla-tube over 6 cm. long .... 8. *erectiloba.*
Corolla-tube not much over 4 cm. long.
Leaves punctate above; calyx-lobes mostly less than 1 cm. long .... 9. *punctata.*
Leaves not punctate above; calyx-lobes nearly 2 cm. long in flower....................... 10. *hymenopogonoides.*
Calyx-lobes subsetaceous for greater part of their length. 7. *Pervillei.*

Pubescence on principal veins below spreading.
Flowers not sessile.
Fruiting calyx-lobes attaining 2–2·5 cm. in length.
Leaves less than 8 cm. long .... 12. *arachnocarpa.*
Leaves over 15 cm. long.................................... 16. *pilosa.*
Fruiting calyx-lobes less than 1 cm., rarely over 1 cm. long, then setaceous.
Leaves markedly scabrid above, with short hairs swollen at base.. 17. *scabridior.*
Leaves not scabrid above.
Leaves less than 6 cm. × 2·5 cm. .... 13. *Humblotii.*
Leaves over 12 cm. × 6 cm............................ 18. *vestita.*
Flowers sessile or subsessile, solitary, or in a few-flowered head.
Corolla-tube less than 5 cm. long, lobes less than 2 cm. 14. *monantha.*
Corolla-tube over 8 cm. long, lobes nearly 3 cm. 15. *fusco-pilosa.*

Note.—The species are arranged as far as possible in order of their affinity.

1. M. ARCUATA Poir. in Lam. Encycl. Méth. iv. 392 (1795). *Landia stelligera* et *L. astrographa* Comm. ex Hb. Mus. Paris. Nom. vulg. "Caca poule" (Bouton).

Madagascar: *Forbes*! *Gerrard*, 18! *Baron*, 6822! *Humblot*, 197! *Lyall*, 288! Central: *Baron*, 570! 2472! 3692! 4767! Nossi-bé: seashore, *Hildebrandt*, 2911! Mbatourana, between Tamatave and Antananarivo: *Meller*! S. Marie Is.: *Forbes*! Mauritius: *Ayres*! *Bojer*! *Bouton*! *Carmichael*, 9! *Graham*! *Hilsenberg & Bojer*! *Roxburgh*! *Sieber* (Fl. Maur.), 78! *Thompson*! Bourbon: *Aublet*! *Balfour*! *Commerson*! *Hardwicke*!

The above do not differ essentially from the Continental specimens (1913, 274). One or two of the Mauritius specimens show signs of a pilose midrib on the under side of the leaves and of hairs in lines on the corolla-tube; but none can properly be classed with my variety *β pubescens* (*l. c.* 274).

M. arcuata is strikingly distinct from all the other Madagascar species in its glabrous shoots, leaves and small flowers, as well as its scandent habit. Bouton remarks of this "arbrisseau liane" that it grows in the ravines in every part of the island of Mauritius, and flowers almost all the year round. He refers to it as a "plante medicinale."

2. M. TRICHOPHLEBIA Baker in Journ. Linn. Soc. xx. 66 (1883). *M. macropoda* Baker, *loc. cit.* xxi. 410.

Central Madagascar: *Baron*, 497! 1764! 2181! 2293! 3088! 3642! 3644! 3974! 7017! Betsileo-land! *Baron*, 107; East Imerina, Andrangoloaka, *Hildebrandt*, 3615! Hbb. Mus. Brit. Kew.

3. M. LANDIA Lam. Ill. t. 157, 2; Poir. in Lam. Encyc. iv. 392. *M. holosericea* Sm. in Rees, Cycl. xxiv. n. 6 (1819). *M. latifolia* Poir. Encycl. Suppl. iv. 36.

Mauritius? Hb. *Blackburn.* Hb. Kew.

In the absence of Poiret's type and the original of Lamarck's figure (*supra*), I find considerable difficulty in identifying this species. According to the figure in question, the leaf-bases are noticeably rounded, and the ovate calyx-lobes and ovary short. The only specimen I can find in the British herbaria which matches this figure at all satisfactorily is the one quoted, originating from the herbarium of Mr. Justice Blackburn, now preserved at Kew. This, collected probably in Mauritius, I am disposed to regard as the true *M. Landia* Poir.

This is distinguished readily from the two succeeding species in size of calyx and ovary on the one hand (*M. Stadmannii*), and in leaf-shape on the other (*M. mauritiensis*).

The confusion which has arisen among these three species is not improved by the fact that De Candolle (DC. iv. 372) gives *M. Landia* Sm. in Rees, Cycl. xxiv. as a synonym of *M. Stadmannii* DC. Smith's *M. Landia* is certainly the same as *M. Landia* Poir. and *M. Landia* Lam. t. 157, for Smith quotes this figure under his *M. Landia*, and Poiret's description refers to the same plant.

4. M. STADMANNII Michx. ex DC. Prod. iv. 372. *Oxyanthus cymosus* Reichenb. in Sieb. Fl. Maur. (*v. infra*) ex DC. Prod. *loc. cit.*

Mauritius: *Sieber* ii. 79! *Bojer*! *Bouton*! *Carmichael*, 165!

Bouton's label reads: "Vulg. *Quinquina rudigera.* Croît dans les forêts dans tous les quartiers de l'Ile. Arbrisseau se couvrant de fleurs blanches. Fl. mois de Février." This has been confused with *M. Landia* (q. v.); but it seems to be quite distinct in its long, sublinear calyx-lobes and its elongated ovary.

5. **M. mauritiensis** Wernham, sp. nov. Ramulis sericeis; *foliis* lanceolatis, longe acuminatis, basi acutis, apice acutissimis, supra asperulo-pubescentibus, subtus in venis sericeo-pubescentibus, *petiolo* dense flavo-sericeo; *floribus* . . . *fructibus* oblongis sparse, pedicellis densius sericeis, corymbose dispositis; *calycis* limbo lobis triangulari-lanceolatis acuminatis acutis dense sericeis coronatis.

Mauritius: "in sylvis, ad radices montium," *Bojer*! "Sur les hautes montagnes," Hb. *Blackburn*! Hb. Kew.

Readily distinguished, even in the absence of flowers, from the previous species and *M. Landia* by the lengthily acuminate, large lanceolate *leaves*. The latter measure 14–22 cm. × 2·3–6 cm.; secondary veins 8–10 pairs; *petiole* to 1·8 cm. *Peduncle* 2·5–3 cm. *Calyx*-lobes 5–7 mm. *Fruit* 1·7 cm. long, 8·5 mm. wide.

6. **M. asperula** Wernham, sp. nov. Ramulis novellis densiuscule appresse pubescentibus; *foliis* oblanceolatis v. anguste obovatis, basi acutis apice breviter acuminatis acutis, supra scabridulis, subtus in venis primariis strigillosis in reticulo minute asperulo-pubescentibus aliter glabris, petiolo brevi, *stipulis* parvis lanceolato-triangularibus alte bifidis acutis insuper subsetaceis; *inflorescentia* bis trichotome corymbosa ramulis appresse pubescentibus, *bracteis* bracteolisque setaceis; *calycis* lobis lanceolatis acuminatis acutis appresse pilosis; *corollæ* tubo extus breviter sericeo insuper parum ampliato, lobis ellipticis mucronatis; *ovario* oblongo sericeo.

Central Madagascar: *Baron*, 493! Hb. Mus. Brit.

Near *M. erectiloba* Wernham, differing in the shape and indumentum of the leaves, &c. *Leaves* 5·5–9·5 cm. × 2·2–3·3 cm.; *petiole* less than 1 cm.; secondary nerves, 7–9 pairs; *stipules* 7 mm. long at most. *Peduncles*, primary, 3 cm. or longer; secondary, 2·5 cm.; *bracts* 8 mm. long. *Pedicels*, 1–6 mm. *Calyx*-lobes to 7 mm. *Corolla*-tube 5·5 cm., lobes 1·4 cm. × 4–6 mm. *Ovary* 6 mm. long.

7. **M. Pervillei** Wernham, sp. nov. Ramulis obtuse quadrangularibus, novellis læviter dilute brunneo-sericeis; *foliis* amplis ovalibus breviter acuminatis acutis, supra asperulo-pubescentibus subtus in venis conspicuis sericeo-strigosis, reticulo tertiario fusco manifesto, petiolis mediocribus nonnunquam longiusculis sæpius appresse sericeo-brunneo-pilosis, *stipulis* rigidiusculis a basi lato triangularibus setaceo-acuminatis extus sericeis; *floribus* in paniculis corymbosis multifloris subtrichotomis ramulis appresse pilosis, *bracteis* setaceo-linearibus; *calycis* lobis subsetaceis; *corollæ* extus primo densiuscule sparsiuscule tandem appresse pubescentis tubo gracili insuper parum ampliato, lobis ellipticis mucronatis; *ovario* breviter strigilloso tardius glabriore, in *bacca* tandem breviter oblonga subglabra a calycis lobis setaceis coronata pedicellata maturante.

Madagascar: North and north-west: *Baron*, 6373! 5800! *Pervillé*! Nossi-bé: *Hildebrandt*, 3003!

Leaves 10–17 cm. × 5·5–9·5 cm.; *petiole* 1–2·5 cm.; secondary veins 10–14 pairs; *stipules* 1 cm. long, 5 mm. broad at base. Flowering *peduncle* about 2·5 cm.; primary bracts about 8 mm. *Calyx*-lobes to about 8 mm., somewhat accrescent in fruit. *Corolla*-tube 3·5 cm., or rather longer; lobes about 1 cm. × 5 mm. *Fruit* 1·7 cm. long, 8–9 mm. wide.

8. **M. erectiloba** Wernham, sp. nov. Arbor, ramulis sparsim et obscure appresse pilosis mox glabrescentibus; *foliis* ellipticis v. oblongis plerumque brevissime acuminatis basique apiceque acutis, supra lævibus nisi in venis hic inde pilis brevibus appressis indutis

glabris, subtus in venis sparsim appresse pilosis, petiolo sæpius breviusculo similiter induto, *stipulis* basi brevi lato oblongo insuper bifidis subulato- v. subsetaceo-linearibus sparsim appresse pilosis; *inflorescentia* trichotome corymbosa ca. 9-flora, *bracteis* setaceis, ramulis subglabris complanatis; *calycis* lobis rigidiusculis a basi anguste triangulari linearibus subglabris; *corollæ* tubo longo gracili insuper parum ampliato extus breviter sericeo, lobis lanceolatis acuminatis acutis; *ovario* anguste infundibulari basi attenuato sparsim strigilloso.

Madagascar: Ankafana, *Deans Cowan*! Tanala, Ambohimitombo forest, 4390-4680 ft., *Forsyth Major*, 274! Hbb. Mus. Brit., Kew.

Allied to *M. trichophlebia* Baker, but differs especially in the shape and indumentum of the leaves and calyx-lobes; and more nearly, perhaps, to *M. Pervillei* Wernham, from which it differs in the size of the corolla and the shape of the lobes.

Leaves 6·5–8·5 cm. × 2·3–3·5 cm., *petiole* to 1 cm., secondary veins 8 pairs; stipule entire, basal part 3–4 mm., with two distant prongs 8 mm. long. Primary *peduncle* 2 cm., secondary *peduncles* 1·3 cm. long, each commonly bearing 3 flowers with pedicels about 8 mm. long. *Calyx*-lobes 1–1·5 cm. long. *Corolla*-tube 6·5–7 cm. long, lobes 1·6 cm. × 4·5 mm. *Ovary* 7 mm. long.

Var. β SCABRELLA Wernham, var. nov. *Foliis* amplioribus supra scabridulis subtus in venis strigillosis; *corolla* minus valida.

Madagascar: Fort Dauphin, *Scott Elliot*, 2607! *Cloisel*, 97! Hbb. Mus. Brit., Kew. Cloisel writes on his label: "Tatome, grand arbre à fleur rouge et blanc."

9. M. PUNCTATA Drake, Hist. Pl. Madag. t. 447 (1897). Frutex nisi floribus subglaber; *foliis* plerumque oblanceolatis brevissime acuminatis acutis, supra trichomis minutis basi inflatis hic inde conspersis punctatis, subtus in venis sparsiuscule brevissime appresse strigillosis, aliter glabratis, petiolatis, *stipulis* triangularibus bipartitis acutis; *floribus* per 1–3 in axillis imis et caulis furcis dispositis; *calycis* lobis linearibus nonnunquam inæqualibus extus qua *ovarium* subcampanulatum ferrugineo-sericeis; *corollæ* breviusculæ tubo extus rufo-sericeo insuper sensim ampliato, lobis oblongo-ovatis submucronatis.

Madagascar: Mahalougouloue (?), *Thompson*! Hb. Mus. Brit.

Remarkable for the almost glabrous, punctate leaves, and the rather short flowers considerably widened above. As in the case of other Rubiaceæ figured so excellently by d'Apreval for Drake's unfinished work, no description, unfortunately, is extant; but I have no doubt whatever that Thompson's plant is specifically identical with *M. punctata* as figured. *Leaves* not exceeding 8·5–9 cm. × 3–3·3 cm., *petiole* 1–1·5 cm., 8–11 pairs of secondary veins. *Peduncle* 0–10 mm. *Pedicel* 1 cm. or more. *Calyx*-lobes usually 1 cm. or slightly longer. *Corolla*-tube 4 cm. long, widening, from a distance of about 2·5 cm. above the base to nearly 1 cm. broad at the mouth; lobes 8·5 mm. × 5 mm.

10. M. HYMENOPOGONOIDES Baker in Journ. Bot. xx. 138 (1882).

Central Madagascar: Tanala, in forest, *Baron*, 313!

Remarkable for the narrow leaves, quite glabrous except for the relatively scanty and closely adpressed hairs on the veins below, and for the long narrow calyx-lobes 1·6 cm. or longer in the flower, and increasing to over 2 cm. in the fruit. The whole plant approaches glabrousness, such indumentum as there is being very closely adpressed; the parts thus present a remarkably smooth appearance.

11. **M. ramosissima** Wernham, sp. nov. Verisimiliter frutex erectus, ramosissimus, ramulis novellis densissime appresse rufo-pilosis cortice tandem cinereo rugosulo indutis; *foliis* parvis oblanceolatis apice subrotundatis nec acuminatis, utrinque præsertim in venis ac subtus densius appresse rufo-pilosis, petiolo dense rufo-sericeo; *stipulis* lanceolatis bipartitis acuminatis acutis; *floribus* in foliorum ramulorum apicem versus confertorum axillis dispositis, longiuscule pedicellatis; *calycis* lobis oblongo-linearibus subacutis dorso in costis 3–5 prominentibus rufo-strigosis; *corollæ* extus densiuscule sericeæ tubo gracili parum insuper ampliato lobis elliptico-ovatis breviter cuspidatis; *ovario* angusto in pedicellum insensim desinente rufo-strigoso a calyce manifeste superato.

Madagascar: *Humblot*, 392! Hb. Kew.

A very distinct species, readily distinguished by the shape of the small, red-haired leaves and the long slender flowers, &c. The affinity is with *M. punctata* Drake, and *M. hymenopogonoides* Baker. *Leaves* 4·5 cm. long, 1·7 cm. broad in upper part, with stalk as much as 6 mm. long and 6 secondary veins, prominent below, on either side of the midrib; *stipules* 5–7 mm. × 2·5–3 mm. *Pedicel* 1 cm., passing into *ovary* about the same length. *Calyx*-lobes 1·2 cm. × 1·7 mm. *Corolla*-tube 5·5 cm. long, lobes 1·3 cm. × 6–7 mm.

12. **M. arachnocarpa** Wernham, sp. nov. Frutex v. arbor, ramulis sparsiuscule hispidulo-rufo-pubescentibus; *foliis* chartaceis oblanceolatis basin cuneatum versus leniter angustatis breviter acuminatis acutissimis, supra in vena centrali impressa minute patento-strigillosis aliter hispidulo-pubescentibus, subtus præsertim in venis prominulis molliter asperulo-pubescentibus, petiolo brevissimo pubescente; *stipulis* binis subulato-setaceis rufo-pilosis; *floribus* in umbellis paucifloris terminalibus dispositis; *bracteis* bracteolisque setaceo-linearibus; *fructu* ellipsoideo costato sparsiuscule rufo-pubescente; *pedicellis* longiusculis ferrugineo-pubescentibus; *calycis* lobis rigidiusculis linearibus subacutis velut bacca indutis.

Madagascar: Fort Dauphin, *Scott Elliot*, 2624! Hb. Kew. Fr. May.

The specimen, unfortunately, bears no flowers; but it clearly represents a distinct species allied to *M. Humblotii*, from which it differs in the shape and indumentum of the leaves, the stipules, &c.

Leaves 5·5–7 cm. × 1·5–2 cm.; *petiole* barely 5 mm. at most, secondary veins 8–11 pairs; *stipules* 9 mm. *Bracteole* (fruit) 6 mm. *Pedicel* (fruit) 1–2 cm. *Fruit* 1·5 cm. long, rather more

than 1 cm. wide, crowned by the persistent *calyx*-lobes attaining nearly 2 cm. in length.

13. **M. Humblotii** Wernham, sp. nov. Verisimiliter frutex erectus, ramulis novellis densiuscule ferrugineo-pubescentibus pilis patentibus, tandem cortice sublævi nec rugoso indutis; *foliis* crassiusculis elliptico-oblongis vix acuminatis acutis basi obtusis v. subrotundatis, supra in vena centrali impressa rufo-strigosis aliter breviter sparsim strigillosis, subtus in venis prominentibus præsertim in centrali densiuscule aliter breviter et obscure patule pubescentibus, petiolo brevi dense ut costa induto; *stipulis* parvis triangularibus acutis setoso-acuminatis bipartitis; *floribus* pedicellis longiusculis dense rufo-pubescentibus in summis axillis solitariis; *calycis* lobis linearibus subacutis rigidiusculis sparse pilosis; *corollæ* tubo extus præcipue insuper densiuscule basin versus sparsiuscule plus minus patente pilosis, insuper nec multo ampliato, lobis ovatis breviter acuminatis acutis extus rufo-sericeis intus minutiuscule pubescentibus; *ovario* dense ferrugine subtomentoso.

Madagascar: *Humblot*, 617! Hb. Kew.

Allied to *M. ramosissima*, but distinct in the soft, spreading pubescence, the leaf-venation, and the size of the flowers. *Leaves* 3·5–4·5 cm. × 1·5–2 cm.; petiole 6 mm. at most; secondary veins 6–9 pairs; *stipules* not more than 6·5 mm. *Pedicels* barely 1 cm. at most. *Calyx*-lobes, to 1·5 cm. long. *Corolla*-tube about 3·5 cm. long, lobes 1·4 cm. × 6·5 mm. *Ovary* 6 mm. long.

14. **M. monantha** Wernham, sp. nov. Frutex ramulis novellis densissime rufo-pilosis; *foliis* ellipticis v. oblongis utrinque angustatis et acutis, supra in vena centrali densiuscule aliter sparsim tamen uniformiter rufo-strigosis margine ciliatis, subtus discoloribus in venis dense aliter sparsim patente pilosis, petiolo brevi piloso; *stipulis* membranaceis hirsutis triangularibus insuper in setis 2 divisis; *floribus* suaveolentibus candidis solitariis sessilibus v. subsessilibus 5–6 meris; *calycis* lobis linearibus nonnunquam setaceo-subulatis inter longiores acutis; *corollæ* tubo insuper nec multo ampliato extus patente hirsuto, lobis ellipticis breviter acuminatis acutissimis extus sparsiuscule appresse pilosis; *ovario* dense ferrugineo-piloso.

Madagascar: *Thompson*! in Hb. Mus. Brit. Between Tamatave and Antananarivo, on clay at 3000 ft., *Meller*! in Hb. Kew.

An isolated species, with *M. fusco-pilosa* Baker, perhaps, as its nearest ally, but with many obvious differences from this; it is especially remarkable for the solitary sessile flowers.

Leaves 7–11·5 cm. × 3·5–4·8 cm., petiole barely 1 cm. at most, stipules 8 mm.; secondary veins 8–11 pairs. *Calyx*-lobes 1·8 cm. long. *Corolla*-tube upwards of 4·5 cm. long; lobes 1·3 cm. × 7 mm. *Ovary* 5–6 mm. deep.

15. M. FUSCO-PILOSA Baker in Journ. Linn. Soc. xxi. 410 (1885).

Central Madagascar: *Baron*, 2467! 2470! 6118!

One of the largest-flowered species known, with corolla-tube nearly 9 cm. long, readily distinguished by the size and long, spreading indumentum of its sessile flowers.

16. M. PILOSA Baker in Kew. Bull. 1895, 105.

North Madagascar: *Baron*, 6179! Hb. Kew.

Distinguished by the dense spreading hairs on the narrow, oblanceolate leaves and the branchlets, and by the long linear calyx-lobes, nearly 2·5 cm. long in the flower.

17. **M. scabridior** Wernham, sp. nov. Ramulis hispidulo-molliter pubescentibus; *foliis* inter majora, supra pilis brevibus curvatis basi inflatis scabris subtus breviter præsertim in venis hispidulis; *stipulis* fere ad basin in setis 2 breviusculis distantibus divisis; *inflorescentia* multiflora corymbosa, ramulis hispidulo-pubescentibus, *bracteis* parvis setaceis; *calycis* lobis lanceolato-linearibus, in fructu parum accrescentibus; *bacca* oblonga costata a calycis limbo persistente coronata.

Central Madagascar: *Baron*, 1505! 3975! Hb. Kew.

With affinities to *M. vestita* this is readily distinguished from all the other species by the markedly scabrid upper surface of the *leaves*. These are elliptical, reaching about 14 cm. × 8·5 cm., with pubescent stalk as much as 2 cm. long; there are 8–11 secondary veins on either side of the midrib; they are but shortly acuminate, with obtuse apex.

18. M. VESTITA Baker in Journ. Linn. Soc. xvi. 166.

Madagascar: *Hilsenberg & Bojer*! Central: *Baron*, 3731! Betsileo-land, *Baron*, 55! *Langley-Kitching*! Hbb. Mus. Brit., Kew.

Distinguished by the thick, velvety, light-coloured tomentum on the under surface of the leaves. According to Hilsenberg and Bojer the native name is *Fatoora*.

β MACROCALYX Wernham, var. nov. Calycis necnon corollæ lobis longioribus, hujus tubo loborum longitudinem bis paullo excedente.

Central Madagascar: Anfakana, *Deans Cowan*! Mt. Antety, above Ambositra, *Forsyth Major*, 635! Hbb. Mus. Brit., Kew.

Calyx-lobes 1 cm. or longer; *corolla*-tube 3·5 cm. long, lobes 1·5 cm.–1·8 cm. × 9 mm.

SPECIES DUBIÆ.

M. ERIANTHA Rich. in Mém. Soc. Hist. Nat. Par. v. 246 (1829). The description is very inadequate. The indumentum of petioles, branchlets and subulate stipules is described as "rufo-sericeis"; and the calyx-lobes are lanceolate and equal; so that the species belongs to the section *Landia*. The subulate stipules should be distinctive, as also the silky, presumably adpressed, indumentum.

M. THOUARSIANA Baill. Adans. xii. 295 (1879). Based on a plant gathered by Dupetit-Thouars in Madagascar. Described as glabrate, with leaves sometimes irregularly denticulate on the margin; inflorescence very dense and much branched. These characters are unfavourable to the inclusion of this plant in the genus *Mussænda*, as is also the presence of a spurious wing to the seeds. The corolla is unknown; and the author himself expresses a doubt as to the genus.

M.? CITRIFOLIA Lam. Encyc. iv. 393 (1797). Nom. vulg. *Charro*, Rees Cycl. xxiv. According to the description, the leaves are borne 3 at each node, the calyx and corolla are glabrous, and the latter is small. These characters suggest that this plant, which was collected by Martin in Madagascar, should not be included in this genus; and a similar conclusion applies to the so-called nearly allied *M.? longifolia* Lam., *l.c.*

M. DISCOLOR Thouars, in Roem. & Schult. Syst. v. 254 (1819). Another imperfect description. Baker (Hb. Kew) is of opinion that this may be identical with his *M. vestita* (*q.v.*); and in view of the description, "foliis . . . subtus piloso-canescentibus," this is not unlikely. As a matter of fact, the very locality is doubtful.

THE MOSS FLORA OF SUFFOLK.

By Arthur Mayfield.

The following list of Suffolk mosses is intended to supplement the two papers published by the Rev. E. N. Bloomfield in this Journal for 1885 (pp. 233–238) and 1888 (pp. 69–71).

During 1912–13 I have been gathering mosses in the county, chiefly in the parish of Mendlesham, near the centre of the county, where the subsoil is mainly the chalky boulder clay. I have thus been able to add considerably to the East Suffolk list, and also to record the occurrence of plants which either had escaped notice or were not considered species by the earlier botanists.

Mr. Bloomfield kindly allows me to include some additional records published by him in the *Transactions of the Norfolk and Norwich Naturalists' Society* (vol. vii. pp. 227, 427) and in the Victoria County History; these are indicated by the initials E. N. B. A few records are quoted from the *Census Catalogue of British Mosses.* These are given on the authority of the late Prof. Barker, but owing to his death information as to the exact localities whence they were obtained has been lost.

All the plants of my own gathering have been submitted for verification and correction to Mr. Wm. Ingham; I have also received much valuable help from Mr. Bloomfield and Messrs. W. H. Burrell, H. N. Dixon, and W. E. Nicholson, to all of whom I tender my thanks.

Names of mosses hitherto recorded for Suffolk are preceded by an asterisk.

Sphagnum acutifolium Ehrh. var. *subnitens* Dixon. 25 and 26. Redgrave Fen, east and west. (The boundary line between the two vice-counties divides the fen into two nearly equal parts.) —*S. fimbriatum* Wils. 26. West Suffolk, *Census Catalogue.*

Polytrichum strictum Banks. 25. Herringfleet (*Turner*, 1806), *E. N. B.*—*P. gracile* Dicks. 25. Mendlesham.

**Dicranella Schreberi* Schimp. 25. Mendlesham.

Fissidens viridulus* Wahl. 25. Mendlesham. — *Var. *Lylei* Wils. 25. Mendlesham and Old Newton. — *F. incurvus* Stark. 25. Mendlesham; Gipping.—*F. bryoides* Hedw. 25. Mendlesham; Brockford.—F. decipiens* De Not. 25. Stuston Common.

Rhacomitrium canescens Brid. var. *ericoides* B. & S. 25 or 26. Suffolk (*Eagle*), *E. N. B.*

Phascum cuspidatum Schreb. var. *piliferum* Hook. & Tayl., and *var. *curvisetum* Nees & Hornsch. 25. Mendlesham.

Pottia crinita Wils. 26. West Suffolk, *Census Catalogue.*—*P. Starkeana* C. & M. 25. Belton (*Borrer*), *E. N. B.*; Creeting. 26. Bury (*Bunbury*), *E. N. B.*

Tortula pusilla Mitt. 25. Mendlesham.—*T. lævipila* Schwaeg. var. *lævipilæformis* Limpr. 25. Grundisburgh (*W. R. Sherrin*), *E. N. B.*—*T. ruraliformis* Dixon. 25 and 26. East and West Suffolk, *Census Catalogue.*

**Barbula lurida* Lindb. var. *intermedia* Ruthe (nearly approaching *B. cordata* Dixon). 25. Needham Market.—*B. tophacea* Mitt. 25. Mendlesham; Playford.—*B. cylindrica* Schimp. 26. Drinkstone churchyard. — *B. vinealis* Brid. 25. Mendlesham. — *B. sinuosa* Braithw. 25. Sweffling, *E. N. B.*; Mendlesham; Needham Market. 26. Great Finborough. — **B. Hornschuchiana* Schultz. 25. Mendlesham.—*B. convoluta* Hedw. 25. Mendlesham; Playford.

Orthotrichum cupulatum Hoffm. 26. Sweffling, *E. N. B.* 26. Great Finborough.—*O. tenellum* Bruch. 25. Finningham.—*O. pulchellum* Smith. 25. East Suffolk, *Census Catalogue.* Mr. Bloomfield assures me that he has it on good authority that Braithwaite's record of this plant from Burgh Castle was erroneous.

Physcomitrella patens B. & S. 25. Mendlesham.

Philonotis fontana Brid. var. *falcata* Brid. 26. Tuddenham, *Skepper.* Recorded as *P. calcarea* in Journ. Bot, 1885, 286, but corrected by Mr. Bloomfield in Trans. Norf. & Norw. Nat. Soc. vii. 427.

Leptobryum pyriforme Wils. 25. Ditches at Mendlesham and Playford.

Bryum pendulum Schimp. 25. East Suffolk, *Census Catalogue.* —*B. pseudo-triquetrum* Schwaeg. 25. East Suffolk, *Census Catalogue.* — **B. erythrocarpum* Schwaeg. 25. Mendlesham. — **B. murale* Wils. 25. Mendlesham.

Mnium affine Bland. 25. Stuston Common; Nacton; Creeting.

Cryphæa heteromalla Mohr. 25. Trees about Yarmouth, *Botanists' Guide.*

Pterogonium gracile Swartz. 26. Icklingham (*Eagle*), *E. N. B.* in Victoria County History.

Thuidium abietinum B. & S. 25. Stuston Common. — *T. hystricosum* Mitt. 26. Barton Mills (*Borrer, Braithwaite*), *E. N. B.*—**T. recognitum* Lindb. 25. Stuston Common and Creeting.

**Climacium dendroides* Web. & Mohr var. *fluitans* Hüb. 25. Stuston Common.

Brachythecium rivulare B. & S. 25. Playford.

Eurhynchium Swartzii Hobk. 25. Mendlesham.

Amblystegium varium Lindb. 25. Mendlesham; Old Newton; Needham Market.—**A. irriguum* B. & S. 25. Mendlesham.

Hypnum riparium* L. var. *subsecundum* Schimp. 25. Mendlesham.—*H. elodes* Spruce. 25. Redrave Fen, east.—H. stellatum* Schreb. var. *protensum* Röhl. 25. Mendlesham.—**H. aduncum* Hedw. var. *falcatum* Hedw. 25. Mendlesham.—*Var. *gracilescens* Schimp. and var. *polycarpon* Bland. 26. Knettishall. — *Var. *intermedium* Schimp. 25. Redgrave Fen, east; Stuston Common. —*Var. *paternum* Sanio. 25. Mendlesham; Stuston Common.— **H. Sendtneri* Schimp. 25. Stuston Common. — *H. Wilsoni* Schimp. var. *hamatum* Lindb. 26. Tuddenham (*Skepper*), *E. N. B.* —*H. lycopodioides* Schwaeg. 25. East Suffolk, *Census Catalogue.* —**H. revolvens* Swartz. 25. Redgrave Fen, east.—*H. cordifolium* Hedw. 25. Bogs on Bradwell and Belton Commons, *Botanists' Guide.*—*H. giganteum* Schimp. 25. Redgrave Fen, east.

A NEW ANNONA FROM JAMAICA.

By W. Fawcett, B.Sc., & A. B. Rendle, F.R.S.

Annona prætermissa, sp. nov. *Arbor* parva, ramulis novellis puberulis mox glabris. *Folia* elliptica vel ovato-elliptica, apice subacuminata, basi late cuneata, supra basim versus atque in costa media subinde pubescentia cetera glabra, subtus subtiliter adpresse pubescentia, supra costis planis et venis subobsoletis infra costis prominentibus et venis planis; petioli pubescentes. *Pedunculus* biflorus, tomentosus; pedicelli supra medium bracteolati, tomentosi. *Alabastra* acuminate conica. *Sepala* late deltoidea, tomentosa. *Petala* tria, oblonga, extra tomentosa, intus subcarinata. *Fructus* globosus, areolatus, tuberculatus, tuberculis apice hamatis. Type in Herb. Jam.

A small *tree*, about 15 ft. high. *Leaves* 12–18 cm. l., 4·5–8·5 cm. br.; petioles 13–16 mm. l. *Peduncle* very short to 1 cm. l.; pedicels very short to 1·4 cm. l. *Sepals* 2·5–3 mm. l. *Petals* 2·5 cm. l., ·5 cm. br. *Stamens* 2 mm. l,; anther about 1·5 mm. l. *Fruit* about 6 cm. in diam. *Seeds* 17 mm. l., 10 mm. br.

Hab.—Craig Hill, near Gordon Town, June, 1902, *Fawcett*!

Near *A. jamaicensis* Sprague, but easily distinguishable by the longer, oblong petals, the conical, not ovoid, buds, the areolate fruit and larger seeds.

ROBERT JACOB GORDON.

(1741–1795.)

By James Britten, F.L.S.

The *Biographical Index of British and Irish Botanists* contains the following entry:—

> "**Gordon** —— (fl. 1774–79). Colonel. Travelled in Africa, 1774, and, with Paterson, 1777–79. Discovered and drew many *Stapeliæ*. Masson, 'Stapelia,' pref. viii.; Journ. Bot. 1884, 145. *Stapelia Gordoni* Mass.

This summary, which represented all that was known at the time of compilation, may now be considerably amplified; as a consequence of this, Gordon's name will disappear from the next edition of our book, in which it is clear he has no claim to be included, but it may be worth while bringing together such information as exists about a remarkable man.

In the sale of the Stafford Library at Sotheby's in November last was included a collection of 400 watercolour drawings made by Gordon in South Africa from 1777 to 1790; the drawings—which included natives, quadrupeds, birds, reptiles, and plants as well as plans and views of the district round the Cape and the Orange River—although somewhat crudely executed, are evidently extremely accurate, and are furnished with descriptions in Dutch: the views and plans, many of which are very large, are in two volumes atlas elephant folio, the drawings in four volumes elephant folio. The collection was purchased by Messrs. Maggs Brothers, of 109 Strand, for £690, and was promptly placed on the market by them at almost double the price—£1250. A special catalogue ("Supplement to Catalogue 316") was issued by them which contains reproductions of two of the maps, of the drawing of a Hottentot man, woman, and child, of two native groups, of a giraffe and another animal, and lists of the animals and plants figured—of the latter in somewhat unfamiliar form—*e.g.* "Orthnathogicum" for *Ornithogalum*.

The early history of the collection, however, is given in a letter to Banks from Philip Gidley King (1758–1808), who at the time of writing was Lieutenant-Governor of Norfolk Island but was then in London. A copy of this is preserved in the Banksian Correspondence, and may be worth transcription:—

"London, May 27th, 1797.

"Sir,

"Agreeably to your wish, I have informed myself more fully respecting the Papers of the late Colonel Gordon, brought to this Country by his widow.

"The Charts, &c., are contained in two Boxes (which I saw inspected yesterday at the Custom house). The largest Box contains, as Mrs. Gordon informs me, a general Chart, smaller Charts and Views of the Interior parts of Africa seen and visited by her late husband, in all about ninety-five, with a Manuscript account wrote in Dutch. There are also a few bundles of family Papers. The second Box contains a very full and large Book, in which are arranged upwards of 400 drawings of Natural History, appropriate to the Charts and Views.

"The Charts and Natural History Mrs. Gordon informs me were all designed by her own husband, who drew every outline, and had them finished under his own eye. As her wish is to have these Charts, &c., inspected by such persons as may be deemed adequate to judge of their consequence to this kingdon, she desires me to request in her name the indulgence of their being permitted to be withdrawn from the Custom house, where they are now lodged, without being subject to the duty.

"I beg leave to apologize for the part I have taken in this business, to which I am alone prompted by the respect I bear to the memory of her deceased husband, and her situation as a stranger in this Country, from whence it is her intention to depart with her family for her native Country, Switzerland, the instant her business is finished.—I have the honour to be most respectfully,

"Sir, Your most obedient,
"humble servant,
"Philip Gidley King."

From this it is clear that Banks knew of the collection and had some thoughts of obtaining it. Whether it actually reached him I do not know; but it may be noted that in the Banksian collection of Masson's drawings (see Journ. Bot. 1884, 144; 1885, 227) are two—*Hoodia Gordoni* and *Pachypodium namaquanum*—which are labelled "Webber" in Dryander's hand, the latter being noted by him as "copied from a drawing of Captain Gordon's at the Cape of Good Hope"; it may however well be that this information was supplied to Dryander by Masson. This drawing is reproduced in Lieut. William Paterson's *Narrative of Four Journeys into the Country of the Hottentots and Caffraria* (1789): it seems likely that the other figures of plants in the volume are from the drawings of Gordon, who accompanied Paterson on his journeys in 1777 and 1779, and to whom the latter frequently refers. Masson (*Stapeliæ*, viii.) mentions both Gordon and Paterson—who in his book always spells his name "Mason"—as having "discovered some very remarkable species of *Stapelia*"; his description and figure of *S.* (*Hoodia*) *Gordoni* are taken from the drawing referred to above.

According to the Maggs Catalogue, "Colonel Robert Jacob Gordon was a Dutchman of Scottish extraction, born in Guelderland in 1741. He was in command of the Dutch forces at the Cape, and it is said that when the English took the Colony in 1795 he shot himself in chagrin at the failure of his resistance to our arms." Paterson (*l. c.* 113), under date August 1779, gives an account of his naming of the Orange River in honour of the Prince of Orange, which however (*l. c.* 61) he seems to have done previously in 1777. Incidentally, it would appear that it was indirectly to Gordon that Australia is indebted for its great wool industry, as his widow in 1795 sold to the commanders of the *Supply* and *Reliance* sloops of war some merino sheep which were taken to Australia to Captain John Macarthur, who was then experimenting in wool production in New South Wales.

A warm appreciation of Gordon will be found in John White's *Journal of a Voyage to New South Wales* (1790), p. 90. White visited Gordon at the Cape in 1787; his garden, he says, displays "not only the taste and ingenuity of the gardener, but the skill and knowledge of the botanist." "The Colonel is a man of science of an active and well-cultivated genius, who appropriates those hours he can spare from his military duties (in which he is said to excel) to a perusal of the book of nature and researches after useful knowledge." It was his intention "to publish the observations and remarks which have been the result of his researches," and it is to be regretted that this intention was never carried out, as we may share White's conviction that Gordon had "made himself better acquainted with the subject, and penetrated farther into the interior parts, than any traveller or naturalist that [had then] visited the Cape." It is to be hoped that the collection of Gordon's drawings may find its way into the possession of someone who will see that lists of the species collected by him are drawn up by competent hands.

SHORT NOTES.

Ptilota plumosa Ag. in Devon (p. 35).—Mr. A. D. Cotton, writing of *Ptilota plumosa* and two other algæ, says that "none of them are found in any part of the English Channel. . . . it was not easy to understand why these plants should not extend by way of the Welsh coast to Devon and Cornwall"; and in a footnote to p. 39 says that a fragment of a frond of the *Ptilota* inscribed "Ilfracombe, E. T." occurs in Prof. Phillips's collection, but "as the plant does not occur in this well-worked region, the locality given must be regarded as erroneous." In July, 1907, I found, about four miles east of Ilfracombe, a plant I sent to Mr. E. M. Holmes, which he returned to me labelled, "It certainly is *Ptilota plumosa*," with drawings made by him on the back to show its structure as compared with that of *P. elegans*.—C. E. Larter.

A Correction (p. 43).—The interviewer from the *Morning Post* who visited me on Jan. 13th, in writing out his notes has mixed up two entirely distinct statements. He asked me, How many plants are there in Tropical Africa? I told him it was impossible to estimate the number, because many districts had not been explored yet, and gave him an illustration of this—Mr. and Mrs. Amaury Talbot's collection from Southern Nigeria recently worked up and published by the botanists of the Natural History Museum. This contained 600 numbers, of which 150 proved to be new. Then we spoke of the plants of the whole world; I gave him 200,000 species as a rough estimate. When his report was published I was startled to find that it stated Mr. and Mrs. Talbot's Nigerian collections numbered 200,000 instead of 600 species!—J. G. Baker.

REVIEWS.

The Story of Plant Life in the British Isles: Types of the Common Natural Orders. Introductory volume by A. R. Horwood. Illustrated with 73 [figures from] photographs. 8vo, cloth, pp. xiv, 243. London: J. & A. Churchill. Price 6s. 6d. net.

It is forty-five years since Sir Joseph Hooker pointed out, in the preface to his *Student's Flora*, the need for a companion volume to that work which should summarize "those physiological and morphological observations on British plants which have of late given so great an impulse and zest to botanical pursuits," and held out a prospect that he might at some future time be able to undertake the task. Long as his life was, this hope was never realized, and the need for such a work is far greater than ever. Indeed, it may well be doubted whether any single volume of reasonable extent could adequately present even a summary of such observations, to which would have to be added some consideration of the investigations grouped under the name of ecology.

The statement in the preface to Mr. Horwood's book that he had "endeavoured to give briefly a connected account of the essential phases of the life-history" in the case of the plants selected for description led us to hope that the scheme proposed by Hooker had at least been attempted; and the announcement that his "method of description is an advance upon previous works of the kind" induced pleasurable anticipations. We regret that in neither respect have these anticipations been fulfilled. We cannot see that his book as a whole differs to its advantage from many of those already on the market; from the literary point of view it is indeed distinctly below them, for Mr. Horwood's style is involved, and it is not always easy to determine what he means. This criticism may sound harsh, but we do not think anyone who will read the first five paragraphs of the Introduction will consider it too severe; we will quote only the fifth. Having told us that "physical surroundings play a great part in the shaping of species, apart from their diversity and the fact that these diversities are correlated with plant distribution and plant variation," Mr. Horwood continues:—

"But this is not all, for we learn from the character of the surroundings its requirements as regards light, heat, moisture, altitude, soil, &c., and the manner in which the plant occurs, either in small communities, large ones or otherwise helps us to obtain a much broader and more intelligent view of the vegetation of a district, or its physiognomy on a large scale, which in turn reveals to us the bases of scenery and landscape. So that here the painter or the poet may join in the study of botany from a really vital standpoint." It is to be regretted that the schoolmistress whose help in revising the proof-sheets Mr. Horwood acknowledges did not add to her "many helpful suggestions" one as to the need for clearness of expression and another as to the principles of punctuation.

Leaving the Introduction, in which is much that might be criticized, we come to the descriptive portion. Mr. Horwood's plan is to select for description "common types" of "the more widely distributed and more familiar orders." We are unable to discover on what principle his selection has been made: thus, in Monocotyledons, *Melanthaceæ*, with one representative, is included, while *Liliaceæ* and *Amaryllidaceæ*, which include the wild Hyacinth and the Daffodil, are omitted; in *Glumaceæ* we have some account of *Cyperaceæ* and a description of *Eriophorum*, but the Grasses are entirely absent, and this from a work which purports to be a "handbook of the common Natural Orders"! "The rarer representatives of the orders will be dealt with in a forthcoming work"—a statement which seems to mean (see p. 219) that the orders not included in this volume will appear there: anyway, it is not easy to see how the Daffodil, the wild Hyacinth, and the whole of the Grasses can be included under this head. Nor is "the beginner" greatly helped by being told that "reference can easily be made to more comprehensive works." What he wants is one book, and there is no reason why a volume of this size should not suffice his requirements.

Turning to the "life-history" of the plants, which it is the main object of the book to present, it is fair to say that Mr. Horwood gives a good deal of useful information as to the habits of the plants described, and details connected with fertilization receive more attention than is usual in popular books. In this respect the author's hope may claim to have been to a certain extent realized, but his treatment leaves much to be desired. We find no account of the seedling state of any species: nor, to take a single example, is any reference made to so common and striking an occurrence as the propagation of *Cardamine pratensis* by means of its leaflets, or to the curious and almost equally frequent proliferation of its flowers. Omissions of this kind are serious in a book the object of which is "to bring the student *into the field* [author's italics] to study"; and we are bound to say that we do not find in his descriptions much indication of original observation.

The book suffers throughout from want of arrangement, which leads to useless repetition. To take an example, the Holly is described both under "the Holly group" (pp. 78–80) and at length under its special heading (pp. 80–82); if the two descriptions had been combined, and the matter rearranged, at least a page would have been saved. Its chief defect, however, is in the prominence of matter in no way relevant to "life-history," although painfully familiar to readers of "popular" books. Still keeping to the account of the Holly, we find the following:—

"In Northumberland holly leaves were used for divining. It was planted near houses to ward off lightning, as early as the days of Pliny. Because it resembles the word 'holy' it was reputed to be inimical to witches. Holly wreathes [*sic*] were employed in Roman times at weddings. People used to cure their chilblains by threshing [*sic*] them with holly leaves. The bark has been used in place of cinchona, being astringent" (p. 82).

It is difficult to imagine that unauthenticated scraps of this kind—even if accurate, which we do not think is always the case—can be of the slightest value to any serious student. The same may be said of the scraps of verse—Shakespeare is misquoted on p. 55 and Samuel Lover on p. 96; the dedications—there is no authority for saying that *Caltha* "is called Marigold because it was dedicated in mediæval times to the Virgin Mary"; snippets from Gerard, "Baldur" (p. 141), and the like; and the references to foreign species.

A further example of padding is found in the space devoted to the popular names of the species, which have been appropriated wholesale from the *Dictionary of English Plant-names.* Mr. Horwood has not even taken the trouble to consult the body of that work: he has simply "lifted" from the index, in which all the English names are conveniently placed under their Latin equivalent, such portions as suited his purpose. He has not even taken the trouble to do this correctly; thus in taking the twenty-three names of the Ash (p. 158) he misprints "Urchin, Woodbroney" as "Urchin Wood, Croney"; and tells us that "Esh"—the north-country variant of Ash—"means to flog, the twig of an ash being used for the purpose"! This astounding derivation, worthy to stand beside Dr. Brewer's "Coltsfoot—cold's food, *i.e.* food for colds and coughs"—is at any rate, in common with others (see "Bow Thistle," p. 145) equally ridiculous, Mr. Horwood's own; the *Dialect Dictionary* gives no such use of the word. Nor has he even appropriated intelligently, for he includes words obsolete and of doubtful application; thus he gives as "common names of the Violet" several to which in the *Dictionary* a "?" is attached. Under *Tilia* we have this amusing note: "Though Pliny gave the name 'Tilia,' there are some old vernacular names that might equally have given origin to it, such as Teile, Til," &c.—names which anyone but Mr. Horwood would have seen are derived from *Tilia.* Perhaps, considering the numerous misprints and the unintelligent way in which the names are printed, it is as well that Mr. Horwood should not have acknowledged the source of his information, even by placing it in the very inadequate bibliography (p. 222); nevertheless this wholesale appropriation of other men's work calls for explanation either from the author or from his publishers, whose attention we call to the fact.

The numerous figures from photographs which accompany the descriptions are very unequal: some—*e. g.* Violet, Sloe, Angelica, and Coltsfoot—are good, others—*e. g.* Broom, Meadow Cranesbill, Groundsel—the reverse. The indications of size are sometimes misleading—*e. g.* the flowers of Stitchwort and Oxeye Daisy do not appear to us "enlarged." As a rule the attempt to show the whole or a considerable portion of the plants leads to indistinctness—*e. g.* the Gean, Tufted Vetch, Creeping Buttercup, and many others; the Cuckoo Flower shows only white flowers standing out of a black background. This method of illustration has its advantages, but unless it is very well carried out, these are not always apparent.

It remains to be said that the volume would be improved by more careful reading; we have already referred to the need of revision as to composition and punctuation, and to the numerous misprints in the names extracted from the *Dictionary of English Plant-names*, but others occur—e. g. *Dioscoreaceæ* is spelt "Dioscoraceæ" (pp. x, 198 (twice), 209, 244) and "Dioscoriaceæ" (p. 222), but never correctly; "Anagræcum" (p. 201), "Tofeildia" (p. 206, thrice), "Brittanicæ" (p. 224).

We should not have noticed the book at such length had it not been for the author's somewhat pretentious estimate of its importance and for the fact that it is the first of three volumes, the remaining two of which are "to be published very shortly." It would have been easy to have extended our criticism; but sufficient has been said to show that Mr. Horwood would do well, before sending these to press, to submit them to a friend who has a blue pencil and is not afraid to use it. We would also suggest that, should he wish to borrow extensively from works already in existence, it would be courteous to obtain permission to do so, or at least to acknowledge the source of his information.

James Britten.

Three Books on Fungi.

1. *Mildews, Rusts, and Smuts: a Synopsis of the Families Peronosporaceæ, Erysiphaceæ, Uredinaceæ, and Ustilaginaceæ.* By George Massee, assisted by Ivy Massee. Pp. 229; 5 plates, 1 coloured. Dulau & Co., Ltd. 1913. 7s. 6d. net.
2. *The Fungi which cause Plant Disease.* By F. L. Stevens, Ph.D. Pp. ix and 754; 449 figs. New York: The Macmillan Company. 1913. 17s. net.
3. *The Diseases of Tropical Plants.* By Melville Thurston Cook, Ph.D. Pp. xi and 317; 85 figs. Macmillan & Co., Limited, St. Martin's Street, London. 1913. 8s. 6d. net.

1. Mr. Massee has added another to his already long list of fungus text-books. The groups included are, with the exception of Perisporiaceæ, indicated in the subtitle, and a "chapter" is devoted to each. An account is given of the interesting points in the life-history of each family, followed by a description of the essential characters. A useful generic key is added and a note to each genus. The genera and species are then described. In the case of Peronosporaceæ a key is given to the species of each genus. An innovation is the introduction into these keys of fungi not yet found in this country but which are liable to be met with as the host-plants are present. In the rusts, descriptions are given of European species of *Puccinia* and *Uromyces* parasitic on native

British plants, but not recorded as occurring in Britain. The idea is excellent, but it is rather disconcerting to find that in both cases many well-authenticated British records have not been accepted.

The treatment of the Peronosporaceæ and Erysiphaceæ calls for no special comment, save that what is said of *Phytophthora erythroseptica* shows that Pethybridge's account of the life-history of the fungus has not been carefully read, and the comments indicate a want of knowledge of recent work on the genus. The treatment of the Uredinales seems far from satisfactory. Certain species of *Æcidium* and *Uredo* are placed in an appendix, though in some cases, e. g. *Æcidium leucospermum*, the alternate stage is well known on the Continent, and ought certainly to have been mentioned. To accept most of the biological species of *Puccinia* and then to give only three species of *Melampsora* seems illogical. It is interesting to find that *Phragmidium Fragariastri* is made to include *P. Poterii*, *P. Sanguisorbæ*, *P. Potentillæ*, and *P. Tormentillæ* on the ground of morphological transitions. Truly, *P. Tormentillæ* seems at present to be undergoing many vicissitudes (*cf.* p. 53). The author also considers that *Hemileia americana* is our only British species. There are many misprints. Mistakes are also far from infrequent. "The only British species" of *Endophyllum* (p. 68) becomes the usual two on p. 93. Biffen (p. 129) is given credit for experiments performed by Tranzschel and confirmed by Brooks. The collaborator of Pethybridge in the investigation of the potato disease becomes "Murray" instead of the more appropriate "Murphy." The "ascigerous condition" of *Calyptospora Gœppertiana* is given in plate iii. The genus *Chrysomyxa* seems to be absent altogether, except in one of the plates, whilst *Pucciniastrum* is apparently represented by one species of *Uredo* placed in the appendix. There is little, if anything, new in the treatment of the Ustilaginales.

In three places are statements with regard to the lack of books dealing with the microscopic fungi here considered. "It is now nearly half a century since the last British book on fungi, including the rusts and mildews, was published." This presumably was Cooke's *Handbook*. The statement is misleading. The fact is that it is now customary to monograph groups separately, and not to consider collectively five families which have practically nothing in common. Perisporiaceæ (two genera, four species) is the only family which has not been treated by a British author since Cooke's book, which included the whole of the fungi.

The book contains an index of genera and species and another of host-plants. Both appear to be very good. The plates give clear line drawings, but their usefulness is questionable; a few text-figures would have been of greater aid to students. The book is of a size that makes it possible to be carried in the pocket. If more care had been taken with it, we imagine that the book, which is strongly bound and well printed, would have been the field companion of most British mycologists; even as it is, it will be found the most convenient for work in the field.

J. Ramsbottom.

2. If any justification were needed for adding to the growing library of works on plant diseases, it would be found in the economic importance of the subject. The cultivation of plants involves the crowding together of species which entails the danger of epidemic attack, so that some comparatively innocuous and negligible fungus becomes by opportunity a destructive parasite. Thus new attacks by fungi or by animals are constantly being discovered, and the life-history of the organism causing the disease must be traced before effective remedial measures can be applied.

The books before us are both by American writers well-known for their work on the diseases of plants, and though they are more or less restricted in scope they are of interest and value to all students.

The volume by Dr. Stevens is, he tells us, "intended to introduce to the student the more important cryptogamic parasites affecting economic plants in the United States," but as fungi, and especially those that cause diseases of plants, are largely cosmopolitan, the book is fitted to be of world-wide service. It often happens that some part of a plant already injured becomes covered with fungal growths, and it is extremely important to know whether such fungi are of parasitic or saprophytic habit.

Dr. Stevens has gone over the whole field from Myxomycetes to *Fungi imperfecti*, selecting those fungi that are known to have caused trouble. He gives synoptic tables and diagnoses of families and genera that are either proved or suspect as the cause of disease, and lists the species that are fatal; in the case of American species he supplies full descriptions. The *Fungi imperfecti* are classified and described as such, but where the full life-history of these forms has been worked out, references are given to the perfect forms. The book is well illustrated, and is provided with copious bibliographies, a glossary of the terms employed in the text, and an index of hosts and parasites. It can be recommended with confidence to all students of this very extensive and difficult branch of botany.

3. Dr. Cook deals only with the diseases of tropical plants. The demand for the vegetable products of the tropics, such as cotton, rubber, cocoa, &c., has increased enormously, and the book has been written with a view to help the planters in their struggle with new and adverse conditions.

The first few chapters give in order a survey of plant life; the nature and symptoms of disease; the structure and function of plants; the classification of fungi; and an account of various causes of plant disease. Other chapters are devoted to a short account of slime-moulds, phanerogamic parasites, bacteria, insects, worms, and, lastly, functional or physiological diseases. Most of the diseases are due to fungi, and a discussion of these occupies the larger part of the earlier chapters.

The second and more extended part of the work deals with the host-plants in due order and the maladies that attack them, starting with corn and rice, and winding up with forest and ornamental trees. Preventative and curative agencies are also discussed. The subject is widely conceived, and, in the limited space, fairly well carried out. It is, however, the fault of many similar books that, in the attempt to tell everything, much is left unexplained. Thus we find that "damping-off" of seedling sugar-canes is caused by three different fungi—*Pythium Debaryanum*, which is fully described in the introductory chapters, *Rhizoctonia*, and *Glomerella*; there is no indication, however, as to the appearance or the affinities of the two latter—they are mere names. The same inequality of treatment is meted out to many other genera and species.

Fungi imperfecti receive scant attention, though they are responsible for many leaf-diseases. Many of them are the imperfect or development stage of some Ascomycete or Basidiomycete, and in not a few instances the full life-history is well known; yet Dr. Cook writes, "The *Fungi imperfecti* are so called because we do not understand their life-history and development."

The illustrations are abundant and instructive, and the book will doubtless be of great value to the agriculturist in the tropics. A bibliography is appended of the literature dealing with cultivated tropical plants.

A. Lorrain Smith.

The Flora of South Africa. By Rudolf Marloth. Vol. i. 4to, with 36 coloured and 30 monochrome plates. London: Wm. Wesley & Son. Subscription price for the volume £2 2*s*.

By his collections of South African plants and his published memoirs Dr. Marloth has won a deservedly high reputation among students of South African botany; it was fitting, therefore, that he should have been entrusted with the task of producing a series of four well-illustrated volumes designed to do justice to the varied and wonderful flora with which he is so well acquainted. In these days of research in all directions, a mere enumeration of genera and species is obviously insufficient for the purpose, since such an enumeration, while indispenable for determining the position and affinities of a plant, leaves the whole romance of its history untouched. Enquiry is much concerned nowadays with the relations of plants to their environment, with the causes underlying the phenomena of their distribution, with details of their structure and chemical constitution, and with the ways in which they are or may be rendered serviceable to the ever-growing wants of mankind. It is from all these points of view that Dr. Marloth has endeavoured to treat the subject. He first gives the characters of a family and then a key to the genera included in it; this is followed by an account, often at considerable length, of species selected as possessing peculiar interest in one or more of the ways above-mentioned. When it is added that the families are sufficiently and often lavishly illustrated by means of coloured and monochrome plates, reinforced by a number of figures in the text, it will be seen that high things have been aimed at, and so far at least as the volume before us permits of a judgment, we have no hesitation in saying, with unqualified success.

The present volume commences with the Thallophyta, treated somewhat shortly but at sufficient length for the student. The *Archegoniatæ* follow, the synopsis of genera and illustrations of each of the families being particularly good. The space devoted to the Gymnosperms has been wisely utilised, and full justice is done to the Cycads and *Welwitschia*. These items disposed of, way has been made for the Dicotyledones, which occupy the bulk of the volume; of the 141 families of these plants recognised by the author 31 are treated here, including all the *Monochlamydeæ* and of the *Dialypetalæ* the Ranales and the Rhœadales. The system followed is mainly that of Engler's *Synopsis*, a system not without its faults, but on the whole an improvement on the linear arrangements previously in vogue, though to old-fashioned folk it will be somewhat disconcerting to find, for instance, Buttercups and Water Lilies in close juxtaposition to Laurels and *Ceratophyllaceæ*. But the author has endeavoured to bring his work, so far as is under the circumstances possible, into agreement with that of his predecessors, references to the *Flora Capensis* being numerous, while Harvey's *Genera of South African Plants* is cited throughout. The treatment and illustrations of the parasitic families *Loranthaceæ*, *Hydnoraceæ*, *Balanophoraceæ* and *Rafflesiaceæ* are worthy of special mention; also of that family, so important at the Cape, the *Proteaceæ*, as of the gall-flowers of the figs. Best of all seems to us the notice given to *Mesembrianthemum*, to which genus 26 figures in all are devoted; the person who can read the fascinating story of the "window-leaves" of certain species of this genus without a thrill of pleasure must, indeed, be without a spark of love for Natural History.

We know of nothing like the present work upon the flora of any of the overseas Dominions, and the Homeland itself, it must be confessed, is in the same predicament. To Dr. Marloth should therefore be given all the credit owing to, though, unfortunately, not always achieved by, those who act as pioneers in the advance of science. He has had assistance from many quarters as, for instance, in the preparation of the drawings for the plates, and Professors Diels and Brotherus and Mr. Sim have taken a hand in the construction of the synopses of genera, while Mr. W. T. Saxton's help has been available for the Thallophyta. The inception of the undertaking is due to Lady Phillips, without whose munificent support it could not have been realised, and who has, in consequence, earned a debt of gratitude from all those who, whether experts or students or travellers, will profit by this truly remarkable production. The printing, by the Cambridge University Press, is a fine example of the workmanship turned out at that well-known establishment.

S. M.

A Naturalist in Western China. By Ernest H. Wilson. 2 vols. with 101 plates. Methuen. Price 30*s*. net.

There is a threadbare proverb about having too much of a good thing, the converse of which would, one imagines, find a more responsive echo in the experience of mankind at large; certainly it was our feeling when we reached the last page of

Mr. Wilson's second volume. We could have wished to know more of his adventures during the eleven years he spent in China —at first on behalf of Messrs. Veitch, afterwards under the auspices of the Harvard University's Arnold Arboretum. As his map shows, he must have toiled along many a breakneck track, escaped perils, witnessed remarkable scenes of which he tells us nothing. A too modest estimate of his narrative powers, above all the desire, as far as possible, not to re-traverse a field where he has had several forerunners, are the considerations that have led him to restrict his personal story.

The provinces of Hupeh, from Ichang westward, and of Szechuan, including in the latter the little known Chino-Tibetan marches, is the region dealt with in these volumes. The difficulties of travel in this part of the Middle Kingdom must be enormous, entailing as it does carriage of bed and bedding, food and cooking utensils, over some of the most villainous tracks trodden by foot of man; nor should that sign of respectability, a chair, be omitted, nor, significant item, a store of insect powder! So provided Mr. Wilson fared cheerily onward, ever on the *qui vive* for botanical spoil, while his companion, Mr. Walter Zappy, busied himself with the rich fauna of the country. We pass with him in spirit through parts of Hupeh hitherto unvisited by Europeans. He takes us across Richthofen's Red Basin of Szechuan, with its wonderful irrigation canals, and so into the mountainous western borderland. For him the mountains had a special call; it was on them he expected to make his principal finds, and, as many a herbarium and the *Plantæ Wilsonianæ*, now in course of publication, testify, the harvest he reaped was indeed a splendid one. And it was at the very threshold of this marvellous region, the home of the richest temperate flora of the globe, that Maries turned in 1879 under the impression that Robert Fortune had already secured virtually all that was worth collecting in China!

Sixty-eight thousand specimens, comprising about five thousand species and seeds of over fifteen hundred plants, were the *spolia opima* Mr. Wilson brought home. How many of these species are new to science cannot at present be stated; but we do know that the labours of recent travellers, such as Mr. Pratt, Professor Henry of Cambridge (not Dublin, Mr. Wilson!), and the French collectors, together with those now under notice, have revolutionised even the best-informed botanists' notions of the Chinese flora. Mr. Wilson's predecessors, however, have given us no record like the present volumes, with their many illustrations of scenery, their exciting descriptions—at one place the author had to pass through masses of Cypripediums so dense as to render crushing the flowers unavoidable; their carefully worked-out zones of mountain vegetation and valuable information for botanist, horticulturist and forester. Several excellent wild fruits were found, which, by grafting, will be the starting point, it is to be hoped, for new and improved varieties. We agree with Mr. Wilson in thinking that the value of certain Chinese reputed medicines should be enquired into; true, some of the remedies now in use are as absurd as those European mediæval compounds which cause us a shudder and a smile; but his own experience seems to show that, though much of the pharmacopœia is fantastic and worthless, there is a residuum worthy of serious testing. On the whole, Mr. Wilson was favourably impressed with the people of the country; but he is deservedly severe on their want of thrift in clearing away the forests, thus leaving a menacing problem for the near future; also on the poor quality of much of their fruit, the result of slovenly cultivation.

Charles Lamb, dilating on the catholicity of his taste, tells us he banished from his shelves only such books as "no gentleman's library should be without." This attitude should, and doubtless would, have caused the great humourist to look askance on *A Naturalist in Western China*, for it answers fully the qualification entailing such banishment, provided, of course, the "gentleman" in question has a taste for natural history; not botany alone, since zoologists, geologists, ethnologists, and sportsmen as well as traders will all find something in these pages to claim their attention. But the appeal in chief is to the botanist and horticulturist, an appeal emphasized by Professor Sargent's essay comparing the forest floras of China and Eastern North America. We trust these handsome volumes, the outcome of indomitable pluck and patience, will meet with the success they so richly merit.

S. M.

BOOK-NOTES, NEWS, &c.

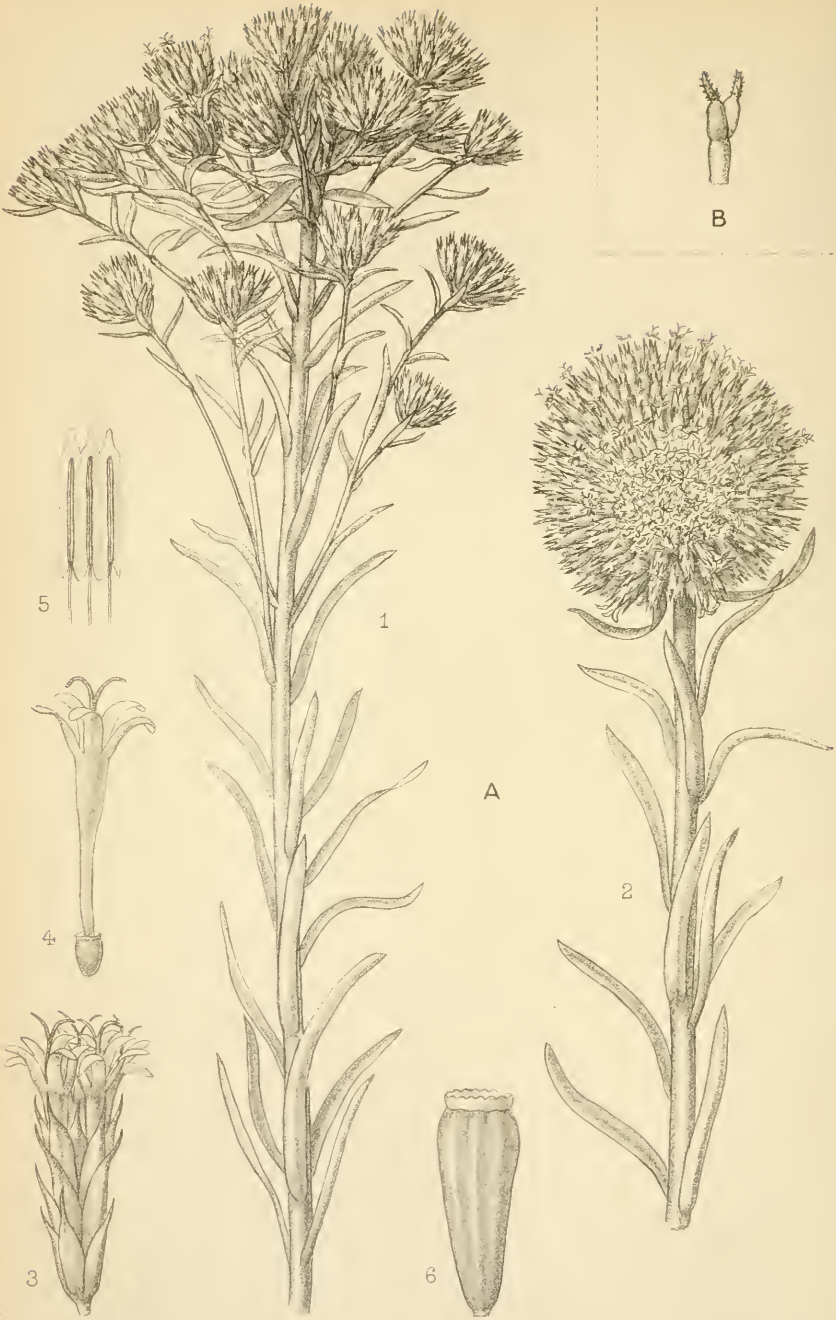
The second volume (first in appearance) of the *Cambridge British Flora* is announced to appear in March. It will contain the orders Salicaceæ, Myricaceæ, Fagaceæ, Corylaceæ, Betulaceæ (by the Rev. E. S. Marshall), Ulmaceæ, Cannabaceæ, Urticaceæ, Santalaceæ, Loranthaceæ, Aristolochiaceæ, Polygonaceæ, Amarantaceæ, and will be mainly the work of the editor, Dr. Moss, who in Chenopodiaceæ will have the assistance of Mr. A. J. Willmott in *Atriplex* and of Mr. E. J. Salisbury in *Salicornia*, the genus *Salsola* being treated by Mr. C. E. Salmon. The order Aizoaceæ is included in virtue of the *Mesembryanthemum* naturalized in Cornwall. The prospectus containing information as to price, *format*, &c., of the work, with a specimen plate, may be obtained from the Cambridge University Press.

Of the Rev. E. F. Linton's Supplement to the "Set of British Salices," to which reference was made in this Journal for 1913 (p. 232), two fascicles have been issued—the first in June last, the second at the end of last year. From the information issued with the second fascicle we learn that "The present venture has been started on a co-operative basis; much material has already been sent in, and more has been offered or promised, by Dr. G. Fogerty, Messrs. R. A. Phillips and A. E. Bradley, and Miss L. Day, towards the first three fasciculi; for the future, specimens of any unusual form or supposed hybrid will be welcome on approval, on the chance of their proving suitable for incorporation, if a sufficient quantity (about thirty-five sheets) from the same stock can be furnished." The first fascicle (1912–13) contains specimens of *S. alba × fragilis*, *S. caprea*, L. f. vel hybrida, *S. caprea × myrsinites*, *S. aurita*, L., *S. cinerea*, L. (two examples), *S. aurita × cinerea*; in the second (1913) are *S. triandra*, L., *S. triandra*, L. f. near subsp. *Hoffmanniana* (Sm.), *S. aurita × purpurea*, *S. cinerea × purpurea*, *S. aurita × caprea*, *S. caprea × repens*, *S. cinerea*, L. forma, *S. Andersoniana × cinerea*, *S. Andersoniana × phylicifolia*. Offers of co-operation should be addressed to the Rev. Edward F. Linton, Edmondsham Rectory, Cranborne.

The parts of Herr Carl Christensen's *Index Filicum* were noticed in this Journal as they appeared during the years 1905–7. There is no need now to point out the remarkable value of this useful work; for all students of ferns recognize its high merits, and the International Congress of Botanists at Brussels in 1910 selected it as the starting-point for the nomenclature of ferns. Herr Christensen has recently published a Supplement (*Index Filicum. Supplementum, 1906–1912.* Hafniæ 1913 apud H. Hagerup. Pp. 133), divided into two parts—the first containing the names of 33 genera and subgenera and of 2611 species proposed during the years mentioned; the second consisting of corrections of, and additional synonyms to, several species adopted in the *Index*.—A. G.

The recent parts of the *Transactions of the Linnean Society* include Mrs. A. Weber van Bosse's account of the Marine Algæ (*Rhodophyceæ*) collected by Mr. J. Stanley Gardiner during the 'Sea-lark' expedition to the Indian Ocean in 1905 (October, 1913); Professor Harvey-Gibson's observations of the morphology and anatomy of *Mystropetalon* (December, 1913); and an account of the cuticles of some recent and fossil Cycadean fronds by Mr. H. H. Thomas and Miss Nellie Bancroft, also published last December. Dr. Weber van Bosse's paper, which is illustrated by three plates, contains the description of two new genera, *Oligocladus* and *Amphisbetema*, and of numerous new species; *Tapeinodasya Ethelæ* commemorates Mrs. Gepp, who has unfortunately been prevented by illness from working out the collection.

Some of the sections of *Die Süsswasser-Flora Deutschlands, Österreichs und der Schweiz*, issued under the general editorship of Prof. A. Pascher, have recently been noticed in this Journal. Another section (Heft 14, Bryophyta. Jena: Gustav Fischer, 1914. Pp. iv and 222; figs. Price, Mk. 5·60, in paper cover; Mk. 6·20, bound), the joint production of three experts, is now published, and comprises the following groups: Sphagnales (C. Warnstorf), Bryales (W. Mönkemeyer), Hepaticæ (V. Schiffner). The number of species comprised in the three groups is forty-eight, one hundred and forty, and sixty respectively. It is at first sight rather surprising to find so many mosses included in a list of water-plants. The explanation is that many species, which normally thrive in a dry habitat, have a capacity for adapting themselves to an aquatic life. The three authors have discharged their task conscientiously, and give careful descriptions of every genus, species, variety, and form, with keys to facilitate the work of identification. The figures are numerous, and many of them are original.—A. G.



P. Highley del. et lith
West, Newman imp

A. Muschleria angolensis *S. Moore*
B. Rhamphogyne rhynchocarpa *S. Moore*.

ALABASTRA DIVERSA.—PART XXIII.

By SPENCER LE M. MOORE, B.Sc., F.L.S.

(PLATE 530.)

I. VERNONIACEÆ AFRICANÆ NOVÆ.*

Ethulia Scheffleri, sp. nov. Fruticosa, ramulis erectis crebro foliosis sessilibus vel subsessilibus lineari-oblanceolatis obtusis vel obtuse acutis basi coartatis margine serrulatis firme membranaceis cito glabris, capitulis subsphæroideis plurifloseulosis ad apicem ramulorum corymboso-paniculatis, inflorescentiis polycephalis foliis majoribus subæquilongis puberulis bracteis subulatis quam pedunculi proprii certe brevioribus præditis, capitulis subsphæroideis plurifloseulosis, involucri 4-serialis phyllis exterioribus parvulis ovato-oblongis acutis vel obtusis interioribus oblongis appendice scariosa purpurea dorso glandulis sessilibus lucentibus induta coronatis, corollis exsertis, achæniis anguste cylindrico-turbinatis truncatis 5-angulatis inter angulos glandulosis.

Hab. Uganda, Lamuru station, 3000 m. above sea-level; *Scheffler*, 288.

Frutex fide cl. detectoris 2 m. alt. Folia 3–8 cm. long., 8–13 mm. lat., accedunt pauca summa 2 cm. × 3 mm. nisi etiam minus. Inflorescentiæ ± 8 × 4 cm. Bracteæ plurimæ 2–4 mm. long. Pedunculi proprii capitulorum profecto evolutorum ± 8 mm. long. Capitula pansa 7 × 7 mm. Involucri phylla extima 2 mm. intermedia 3·5 mm. intima 4·5 mm. long. Corollæ tubus basi tenuis, superne anguste campanulatus, 2·5 mm. long., basi ·3 mm. faucibus 1 mm. lat.; lobi lineari-oblongi, tubo ægre æquilongi. Styli rami exserti, 1·5 mm. long. Achænia vix 1·5 mm. long., brunnea.

Foliage like that of some forms of *E. conyzoides*, but capitula larger with involucres unlike.

Muschleria, *Vernoniacearum* gen. nov. (Plate 530.)

Capitula homogama, tubuliflora, flosculis paucis. Involucrum cylindricum, phyllis pauciseriatis, arcte imbricatis, angustis. Receptaculum leviter foveolatum, nudum. Corollæ regulares, tubo anguste infundibulari, limbo 5-lobo. Antheræ basi sagittatæ, auriculis obtusis anth. contiguarum connatis. Styli rami teretes, hirtelli. Achænia 10-costata, compressiuscula angulataque, apice truncata. Pappus parvulus, cupuliformis, ore undulato. Caules erecti, bene foliosi, singuli vel plures rhizomati persistenti insidentes. Folia alterna. Capitula angusta, in glomerulos densos ad apicem ipsius caulis vel ramulorum brevium aggregata.

Muschleria angolensis, sp. unica. Caule lignoso subsimplici apicem versus solummodo ramoso subtereti in longitudinem costato scabrido, foliis sessilibus linearibus apice mucronatis margine revolutis coriaceis supra scabridis subtus albo-tomentosis, glome-

---

* The types of species described are in the National Herbarium.

rulis subsphæroideis vel corymbosis foliis perpaucis caulinis similibus nisi minoribus nonnunquam stipatis, capitulis 6-flosculosis, involucri 4-serialis phyllis lineari-lanceolatis longe acuminatis dorso carinatis interioribus quam exteriora longioribus omnibus rigidis puberulis, corollis exsertis, achæniis subturbinatis inter costas microscopice glandulosis.

Hab. Angola, Forte Dom Affonso, Munongue and Kaconda; *Gossweiler*, 2907, 3092, 4144, 4325.

Planta 1½–3½ spithamea. Caulis 2–4 mm. diam. Folia solemniter 1·5–4·5 cm. long., 1·5–3 mm. lat., pag. sup. olivacea. Glomeruli subsphæroidei, 2·5–3·5 cm. diam., corymbosi plerumque 6 × 5 cm. vel paullulum ultra. Capitula pansa usque ad 16 × 3 mm. sæpe vero minora. Involucri phylla ext. 4·5–8 mm. long., int. 9–11 mm. Corollæ purpureæ; tubus 7 mm. lobi 3 mm. long. Antheræ 3 mm. long. Stylus exsertus, superne incrassatus hirtellusque; rami 2 mm. long. Achænia 3 mm. long. Pappus ·2 mm. alt.

In appearance this is somewhat like a *Corymbium*, the species of which have 1-flowered capitula, a different involucre and pappus with a lacerated edge.

The generic name has been adopted in recognition of the work, especially on *Compositæ*, of Dr. Reno Muschler.

Vernonia (§ Lepidella) **fontinalis,** sp. nov. Herbacea, bispithamea, caule ex collo satis valido sparsim breviterque lanoso erecto simplici vel pauciramoso sericeo-tomentoso dein pubescente, foliis inferioribus rosulatis sessilibus oblongo-oblanceolatis obtusis chartaceis supra scabriusculis subtus appresse puberulis superioribus sparsis ceteris similibus sed minoribus, capitulis submediocribus pedunculatis subsessilibusve pluriflosculosis corymbos oligocephalos efficientibus, involucri late campanulati sericeo-tomentosi 5-serialis phyllis oblongo-lanceolatis interioribus gradatim longioribus oblongis omnibus obtuse acutis, corollis subexsertis, achæniis turbinatis prominenter 5-angulatis angulis setulosis faciebus glandulis lucentibus inspersis, pappi squamis anguste lineari-lanceolatis acuminatis setis paucis scabriusculis stramineis corollas æquantibus.

Hab. Angola, Kubango, in meadows at the source of the Kuartiri; *Gossweiler*, 4180.

Collum usque ad 1 cm. diam., fibras simplices validas copiose emittens. Folia glandulis immersis creberrime induta, inferiora summum 5 cm. long., 13 mm. lat., superiora ± 3 cm. × 5 mm., summa imminuta nec perpauca in involucri phylla non transeuntia, omnia in sicco viridia. Corymbi summum 10 × 5 cm., sæpe vero breviores. Capitula pansa 11 × 15 mm. Involucri phylla chartacea, extima 4 mm., intermedia 6 mm., intima 8 mm. long. Corollæ ex schedis cl. detectoris rubro-violaceæ; tubus cylindricus, 6·5 mm. long.; lobi lineari-oblongi, obtusi, apice setuliferi, 2·5 mm. long. Achænia 2·5 mm. long. vel paullulum ultra, brunnea. Pappi squamæ achæniis circa æquilongæ, setæ 9 mm. long.

This belongs to the group of species ranged round *V. ambigua* Kotsch. & Peyr. and *V. Petersii* O. & H., and of these most nearly approaching *V. ambigua*, from which the present plant differs chiefly in its rosulate, only puberulous leaves, elongated inflorescences, larger heads, and acute not lengthily acuminate involucral leaves.

Vernonia (§ Hololepis) **Duemmeri,** sp. nov. Caule erecto sursum ramuloso puberulo jam glabrescente, foliis subsessilibus ovato-oblongis apice mucronatis basi obtusis margine crenulatis membranaceo-coriaceis supra scabridis subtus brunneo-pubescentibus, capitulis mediocribus circa 60-flosculosis ad apicem ramulorum (nonnunquam perbrevium) solitariis foliis ultimis perpaucis stipatis, involucri subhemisphærici pluriseriati phyllis lineari-lanceolatis (intimis lineari-oblongis) spinuloso-acuminatis interioribus gradatim elongatis tela araneosa subsparsa onustis, corollis breviter exsertis, achæniis cylindrico-turbinatis 10-costatis inter costas pilosis, pappo biseriali setis albis exterioribus quam interiores multo brevioribus.

Hab. Uganda, Zinga and Ripon Falls; *Dümmer*, 35. [Also Grass land, Uganda; *Rev. C. Wilson*, 72 in Herb. Kew.]

Suffrutex vel frutex, ex schedis cl. detectoris 2–4 ped. alt. Folia pleraque 4–5 × 1·5–2 cm., siccitate brunnescentia; petioli lati, 2–3 mm. long. Capitula 14 × 18 mm., quidque foliis 1–5 nunc 2 cm. (vel etiam majus) long., nunc (sed raro) usque ad 5 mm. diminutis stipata. Involucri phylla extima 2 mm., intermedia 4–6 mm., intima 7·5–8 mm. long.; horum acumen fuscum, leviter induratum, glabrum. Corollæ tubus 7 mm. long., anguste infundibularis, triente inf. ·3 mm. lat., faucibus 1 mm.; lobi lineares, fere 3 mm. long. Styli rami 3 mm. long. Achænia longit. 3 mm. paullulum excedens, optime costata, grisea. Pappi setæ ext. fere 1 mm. long., int. 5 mm.

Easily distinguished by foliage and involucres from the few species of this section.

Probably conspecific with this is another Kew plant collected by A. Whyte in a journey from Nandi to Mumias.

Vernonia (§ Xipholepis) **paludigena,** sp. nov. Rhizomate crasso sparsim fibroso caulem simplicem erectum supra basin nudam foliosum scabriusculum fulciente, foliis late oblanceolatis vel oblanceolato-obovatis apice mucronatis basi in petiolum brevem longe attenuatis margine subargute calloso-dentatis coriaceis nitidis utrinque scabridis costaque media pag. inf. puberula, capitulis submajusculis multiflosculosis in corymbos oligocephalos digestis, involucri subhemisphærici circa 7-serialis phyllis lineari-lanceolatis longe acuminatis margine serrulato-ciliolatis chartaceis superne membranaceis viridibusque exterioribus sæpe plus minus patentibus recurvisve, achæniis anguste cylindricis 10-costatis basi callosis glabris, pappi squamis anguste linearibus acutis setis 2-serialibus scabriusculis dilute stramineis.

Hab. Belgian Congo, in a marsh at Kabinda; *Kassner*, 2832.

Herba fere metralis. Caulis 3–4 mm. diam., eximie striatus. Folia inferiora haud rosulata etsi perpauca infima approximata, 12– fere 20 cm. long., ultra medium 4 cm. lat., in sicco supra

viridi-brunnea subtus pallidiora; petioli circa 1·5 cm. long., supra canaliculati; folia juniora gradatim diminuta. Corymbus circiter 12 × 8 cm. Pedunculi 3·5–12 cm. long. Bracteæ paucæ, lanceolatæ, ± 2 cm. long., ultimæ capitula appropinquantes filiformes, 4 mm. long. Involucri phylla extima 5 mm. long., intermedia 10–14 mm., intima 18 mm., omnia dilute viridi-grisea. Corollæ maturæ haud suppetunt. Achænia basi callosa, brunnea, 6 mm. long. Pappi squamæ 2 mm. long., setæ 9 mm.

The affinity of this is with *V. Melleri* Oliver & Hiern, from which it differs in foliage and capitula. *V. Melleri* was redescribed by O. Hoffmann under the name of *V. scabrifolia*, and referred to his § *Lachnorhiza*. To me this section seems unnecessary, for since the involucres and pappus yield such excellent sectional characters in this genus, I think it a pity to isolate a few species upon the fact of their having some woolly hairs upon their rootstocks: I agree, however, that if such a character is helpful in the grouping of the species of a large homogeneous genus, like *Senecio*, for instance, it may well be brought into use.

Vernonia (§ DECANEURON) **chlorolepis,** sp. nov. Rhizomate crasso sparsim piloso, caule erecto superne ramoso folioso etsi basi nudo valido tereti hispidule scabrido tandem glabrescente, foliis sessilibus oblongo-lanceolatis raro oblongo-obovatis acutis basi angustatis decurrentibus integris vel distanter denticulatis coriaceo-membranaceis pag. utravis scabris vel scaberrimis, capitulis magnis late campanulatis multiflosculosis ad apicem ramorum solitariis corymbum referentibus, involucri subhemisphærici pluriserialis phyllis lineari-lanceolatis (intimis lineari-oblongis) mucronatis interioribus gradatim longioribus rigidis scabriusculis deorsum dilute stramineis sursum viridibus, corollis exsertis, achæniis cylindricis 10-costatis subtiliter pubescentibus, pappi setis 2-seriatis exterioribus abbreviatis scabridis rubiginoso-stramineis.

Hab. Angola, Kubango, in thickets at Forte Princeza Amelia, and Kaconda at Landringo; *Gossweiler*, 2331, 4253.

Caulis circiter ⅓-metralis, 5 mm. diam., longitrorsum striatus. Folia solemniter 7–9 × 1·5–2·5 cm., summa diminuta et in involucri phylla transeuntia, pallide viridia, utrinque prominenter nervosa; reticulum laxum. Capitula matura 2·5–3·5 × 4–5 cm. Involucri phylla extima 8–10 mm., intermedia circa 15 mm., intima usque ad 20 mm. long. Corollæ cœruleæ; tubus extus sparsim glandulosus, angustus, sursum levissime ampliatus, 15 mm. long.; lobi anguste lineari-oblongi, acuti, 8 mm. long. Antheræ exsertæ, 7 mm. long. Styli rami 4 mm. long. Achænia 4·5 mm. long.; pappi setæ ext. circa 3 mm., int. 14 mm. long.

V. carnea Hiern, to which this is allied, has somewhat different toothed leaves, much smaller heads and involucral leaves, although similar in shape, consistence, and colour, very much smaller.

No. 2331 cited above has smaller heads (2 × 4 cm.) than the other, and its involucral leaves a little narrower.

Vernonia (§ DECANEURON) **ornata,** sp. nov. Caule e rhizomate crasso fibrillifero ascendente robusto fistuloso in longitudinem eximie costato glabro, foliis maxima pro parte juxta solum approxi-

matis sessilibus lineari- vel oblongo-oblanceolatis obtusis subdistanter calloso-denticulatis chartaceis utrobique scabriusculis paucis junioribus ceteris similibus nisi minoribus gradatim diminutis, capitulis magnis multiflosculosis corymbum oligocephalum paucibracteatum haud elongatum referentibus, involucri subhemisphærici 5-serialis phyllis lanceolatis (interioribus gradatim longioribus lanceolato-oblongis) acuminatis coriaceis superne vero sæpius membranaceis fuscisque dorso scabriusculis margine scabriusculo-ciliolatis, corollis exsertis, achæniis cylindricis basi callosis 10-costatis appresse setulosis, pappi setis 2-serialibus (paucis extimis abbreviatis) scabriusculis rubicundulo-stramineis.

Hab. Angola, moist meadows in marshes of the Kiuriri near Kassuango and of the Cambambe at Kuebo; *Gossweiler*, 3313, 3885.

Circiter bispithamea. Caulis diam. adusque 5 mm. Folia in sicco viridi-grisea, summum 29 × 4 cm., sæpe 14–18 × 2 cm., caulina seniora ± 10 × 1·5 cm., summa ± 3·5 cm. long.; costa media subtus optime eminens; costæ laterales planæ; reticulum laxum sat difficile aspectabile. Corymbus 2-5-cephalus, ± 10 cm. long. Capitula pansa 3·5 × 4·5–5 cm. Involucri phylla extima 5–10 mm. long., intermedia 15–20 mm., intima vix 30 mm. long. Corollæ violaceæ vel cœruleæ; tubus elongatus, anguste subcylindricus (superne leviter dilatatus), 25 mm. long.; lobi anguste lineari-oblongi, obtusi, longit. 10 mm. paullulum excedens. Antheræ exsertæ, 6 mm. long. Styli rami 7·5 mm. long. Achænia 7 mm. long. Pappi setæ paucæ 5–10 mm. long., complures 20–22 mm.

The affinity is with *V. carnea* Hiern, which, however, is quite unlike it in several respects.

Vernonia (§ Decaneuron) **concinna**, sp. nov. Herbacea, verisimiliter sat elata, caule erecto sesquimetrali vel paullo minus alto valido folioso glabro, foliis caulinis sparsis sessilibus lanceolatis vel oblanceolato-oblongis obtusis margine distanter vel subdistanter calloso-denticulatis basi breviter decurrentibus coriaceis glabris, capitulis mediocribus circa 25-flosculosis in paniculam terminalem angustam crebro bracteatam puberulam cito fere glabram digestis, involucri campanulati 7-serialis phyllis oblongis acutis interioribus gradatim longioribus intimis optime elongatis omnibus (apice fusco exemptis) tomento sordide albo vel dilute brunneo obductis, corollis breviter exsertis, achæniis cylindricis 10-costatis inter costas glandulis lucentibus præditis, pappi setis inter sese fere æqualibus (perpaucis interdum paullo brevioribus) plerisque apice curvatis ciliatis fulvis.

Hab. Angola, Amboim-Novo Redondo, near the Forte Quissaca; *Gossweiler*, 4480.

Caulis 5 mm. diam., in longitudinem eleganter costatus, fuscus. Folia 9–10 cm. long., 2–3 cm. lat. basin decurrentem versus angustata necnon petioliformia, ima basi levissime dilatata, in sicco brunnea vel brunneo-viridia. Panicula circa 30 cm. alt., summum 7 cm. lat.; axis cauli similis nisi angustior; rami ascendentes, distanter bracteati, apice oligocephali (raro monocephali), ± 4 cm. long. Bracteæ ex axi ortæ pleræque 1·5–2 cm. long., 5 mm. lat., margine denticulatæ; bracteæ ramulorum pleræque 5–8 mm. long., summæ imminutæ in involucri phylla transeuntes. Capitula pansa 1·5 cm. long., totidem lat. Involucri phylla extima 2·5–3 mm., intermedia 4–6 mm., intima 10 mm. long. Corollæ tubus anguste infundibularis, 10 mm. long., inferne vix 1 mm. lat., faucibus 2 mm.; lobi oblongi, 4 mm. long. Achænia 3·5 mm., pappus 9 mm. long.

Near *V. Quartiniana* A. Rich., but, among other features, the foliage and capitula of the two are very unlike.

Vernonia (§ Stengelia) **lafukensis,** sp. nov. Erecta, verisimiliter suffruticosa, circiter bispithamea, caule sat valido simplici vel apicem versus rariramoso usque ad inflorescentiam folioso pubescente, foliis subsessilibus oblongo-oblanceolatis basi apiceque obtusis margine denticulatis pergamaceis utrobique in nervis puberulis glandulis immersis præditis pag. sup. nervis planis vel subplanis pag. inf. (ut reticulum arctum) optime eminentibus, capitulis submediocribus breviter pedunculatis 12-flosculosis in corymbum brevem polycephalum bracteatum griseo-tomentellum subcongestis, involucri turbinati circa 7-serialis phyllis ovatis (intimis oblongo-obovatis) chartaceis perpaucis extimis appendice membranacea colorata lanceolata acuminata onustis ceteris appendice late ovata phyll. exteriorum acuminata phyll. interiorum sæpe obtusa vel obtusissima et (costa media dorso excurrente) apiculata, corollis exsertis, achæniis cylindricis pubescentibus obscure costatis, pappi setis pluribus (exterioribus paucis brevioribus) aliquanto complanatis apice sæpe leviter clavellatis scabridis stramineis.

Hab. Belgian Congo, Lafuka River and in open fields at Lufongo; *Kassner*, 2846*a*, 2863*a*.

Folia inferiora 6–9 × 1·4–2·2 cm., superiora gradatim diminuta ± 25 × 7 mm., in sicco griseo-viridia; petioli summum 2–3 mm. long., validi, ut caulis fusci. Corymbi 3–6 × 5–10 cm. Bracteæ foliis similes sed minores (± 15 × 3 mm.). Pedunculi proprii sæpius circa 5 mm. long. Capitula maturata (flosculis inclusis) 18 × 8 mm. Involucri phylla margine dorsoque sæpe pube grisea induta, pauca extima circa 10 mm. long., intermedia circa 12 mm. (inclusa appendice 6 × 6 mm.), intima 12·5 × 4 mm., horum appendix circa 2·5 × 2·5 mm. Corollæ tubus inferne tubulosus, superne subito dilatatus, pars dilatata fere medium usque in lobos triangulari-oblongos obtusiusculos divisa, pars tubulosa 8 mm. pars dilatata (inclusis lobis 2·5 mm. long.) 5·5 mm. long. Antheræ partim exsertæ, 5·5 mm. long. Styli rami 4 mm. long. Achænia 2 mm., pappi setæ pleræque 7 mm. long.

Allied to *V. cardiolepis* O. Hoffm. and *V. Britteniana* Hiern, but differing from both in foliage and in the short crowded inflorescences. The sparsely hairy involucres with acuminate appendages are also good points by which it can be distinguished from the latter, while the involucral leaves of *V. cardiolepis*, besides having a rotundate appendage, are much narrower.

Vernonia (§ STENGELIA) **vallicola,** sp. nov. Suffrutex caule $\frac{1}{2}$-$\frac{2}{3}$-metrali erecto robusto basi nudo alibi crebro folioso densiuscule griseo-pubescente demum glabrescente, foliis sessilibus (summis subsessilibus) ovato-oblongis basi apiceque obtusis margine dentato-serrulatis subcoriaceis supra glabris subtus sparsim pubescentibus costis (reticulo arcto haud exempto) pag. inf. maxime eminentibus, capitulis mediocribus circa 20-flosculosis in corymbum subpaniculatum raribracteatum circiter 10-cephalum foliis duplo longiorem dispositis, pedunculis pedunculisque propriis griseo-pubescentibus his quam capitula plerumque longioribus, involucri cylindrico-turbinati 6-serialis phyllis extimis abbreviatis ovatis intermediis longioribus ovato-oblongis intimis oblongis vel late oblongo-linearibus omnibus chartaceis stramineis (exterioribus stramineo-brunneis) et lamina petaloidea obovata obtusa onustis, corollis breviter exsertis, achæniis cylindricis basi callosis dense appresse setulosis, pappi straminei setis pluribus apice aliquanto dilatatis scabridis paucis exterioribus ceteris brevioribus.

Hab. Angola, Kuito, in the valley of Fiengo; *Gossweiler*, 3781.

Folia solemniter 5–6 × 2–2·5 cm., secus caulem subapproximata (intermedia circa 15 mm. long.), pauca ima perpaucaque summa minora, sc. circiter 3–3·5 cm. long., hæc in bracteas transeuntia, in sicco griseo-viridia. Corymbi 9–10 × 8–10 cm.; bracteæ ± 1·5 cm. long., paucæ capitula appropinqantes anguste lineares, ± 6 mm. long.; pedunculi proprii plerique 1·5–3 cm. long. Capitula pansa 2·8 × 1–1·2 cm. Involucri phylla extima 4–5 mm. long., intermedia (appendice sibi ipsi æquilonga inclusa) 16 mm., intima 16 mm. long., horum appendix circa 3 mm. long. Corollæ tubus attenuatus, sub apice subito in limbum campanulatum fere usque medium lobatum ampliatus, longit. 2 cm. paullulum excedens. Antheræ inclusæ, 6 mm. long. Styli rami 6 mm. long. Achænia 3–4 mm. long., pappi setæ pleræque 12–13 mm.

Easily distinguished from *V. armerioides* O. Hoffm. by the leafy stems, differently shaped leaves with close and prominent reticulation and cylindrical-turbinate involucres.

Vernonia (§ STENGELIA) **castellana,** sp. nov. Herbacea, bispithamea vel paullo ultra, caule erecto simplici basi nuda exempta sparsim folioso pube brevi densiuscula gaudiente, foliis subdistantibus (internodiis plerisque 2–3·5 cm. long.) oblongo-obovatis obtusis obtusissimisve basi in petiolum longum cuneatim coartatis margine undulatis vel denticulatis papyraceis supra scabriusculis subtus in nervis reticuloque eminente pubescentibus, capitulis inter minores circa 15-flosculosis in corymbum subscaposum longipedunculatum abbreviatum satis densum ordinatis, bracteis perpaucis foliis multo minoribus, pedunculis propriis capitulis sæpius æquilongis brevioribusve ut inflorescentiæ rami tomentosis, involucri campanulati pubescentis 4-serialis phyllis intus gradatim longioribus oblongo-ovatis (intimis oblongis) chartaceis appendice ovata (vel phyll. interiorum lanceolata) obtusa vel acuta onustis, corollis exsertis, achæniis cylindricis obscure costatis setulosis, pappi setis 2-serialibus stramineis breviter barbellatis exterioribus abbreviatis angusteque squamatis.

Hab. Angola, on the Cului River, in pasturage at Forte Dom Affonso; *Gossweiler*, 2883.

Foliorum limbus basi sæpe obliqua, 13–15 cm. long. 4·5–6 cm. lat., in sicco griseo-viridis subtus paullo pallidior; petioli validi, ima basi dilatati, obscure decurrentes, supra plani dorso rotundati sparsim pubescentes, ± 4 cm. long.; folia perpauca ultima ± 5 × 2 cm. Pedunculus 30–40 cm. alt., pubescens. Bracteæ perpaucæ vetustiores 2–3 cm. long., 3–4 mm. lat.; juniores capitula appropinquantes lineares, ± 5 mm. long. Capitula (corollis admissis) 12 × 6 mm. Involucrum 7 mm. long.; phylla extima 2–3 mm., intermedia 6–7 mm. intima 9 mm. long. Corollæ cœruleo-violaceæ; tubus superne amplificatus, 8 mm. long. (pars amplificata 2 mm.); lobi lineares, 3 mm. long. Antheræ exsertæ, 2·5 mm. long. Styli longe exserti, rami 2 mm. long. Achænia 2·5 mm. long.; pappi setæ ext. 2 mm., int. 7 mm. long.

In habit this is somewhat like *V. milangiana* S. Moore, in capitula *V. lasiopus* O. Hoffm., near which latter species it should find a place. It is also close to *V. præmorsa* Muschl., which, besides smaller and narrower leaves, has larger heads with broader involucral leaves.

Vernonia (§ STENGELIA) **Anandrioides**, sp. nov. Caule valde abbreviato filioso valido griseo-tomentoso rhizomate satis crasso tubera fusiformia hac atque illac emittente suffulto, foliis rosulatis sessilibus late obovatis apice rotundatis basin versus angustatis et petiolum late alatum mentientibus margine repandis crenulatisve pergamaceis supra glabratis subtus in nervis griseo-tomentosis alibi pubescentibus glabrescentibus, capitulis mediocribus plurifloscululosis paucis ex axillis foliorum solitatim oriundis, pedunculis scaposis erectis quam folia longioribus vel iisdem subæquilongis nudis vel bracteis perpaucis linearibus onustis dilute fulvo-tomentosis, involucri subhemisphærici 4-serialis pubescentis phyllis paucis extimis bracteis similibus lineari-lanceolatis sursum attenuatis ceteris oblongo-ovatis (intimis oblongis) chartaceis appendice brevi lanceolata vel ovata colorata coronatis, corollis exsertis, achæniis cylindricis basi callosis 8-costatis pube grisea obtectis, pappi setis paucis inæquilongis scabriusculis apice aliquantulum dilatatis breviterque barbellatis stramineis.

Hab. Angola, Kubango, in gravelly pasturage near Forte Princeza Amelia; *Gossweiler*, 2132.

Planta summum spithamea, sæpe vero solummodo circa 6 cm. alt., habitu *Plantaginis* alicujus. Caulis 1–2 cm. alt. Folia viva solo applicata, 3·5–7 cm. long., ultra medium 3–4 cm. lat., supra in sicco brunneo-subtus griseo-viridia. Pedunculi 2·5–20 cm. long., apicem versus leviter incrassati; bracteæ dum adsint ± 8 mm. long. Capitula pansa 1·3–1·5 × 2 cm. Involucri phylla extima ± 7 mm. long.; intermedia (inclusa appendice 4 mm. long.) 10 × 4 mm.; intima 11 × 3 mm., horum appendix circa 3 mm. long. Corolla vivide cœruleo-violacea tubus elongatus, attenuatus, 9 mm. long., superne subito campanulatim dilatatus; lobi oblongi, partis campanulatæ dimidium adæquantes, 2·5 mm. long. Antheræ 4 mm. long., superne exsertæ. Stigmatis rami 3·5 mm. long. Achænia 3·5–4 mm. long.; pappi setæ perpaucæ exteriores 3–4 mm., ceteræ summum 10 mm. long.

Near *V. pumila* Kotsch. & Peyr., but with dissimilar coetaneous leaves as well as different involucres. The allied species *V. nandensis* S. Moore has coetaneous but oblanceolate leaves, larger heads and involucral leaves, &c.

Vernonia (§ Stengelia) **campicola,** sp. nov. Caule erecto crebro folioso angulato striatoque pubescente citissime puberulo, foliis amplis sessilibus oblongo-obovatis obtusis dimidio inf. gradatim attenuatis margine late dentatis membranaceis utrinque scabriusculis, capitulis majusculis multiflosculosis paucis (exempl. unici nobis obvii 4) ad apicem caulis corymbosis pedunculisque validis pubescentibus suffultis, involucri subsphæroidei phyllis pluriseriatis interioribus gradatim majoribus chartaceis exterioribus ovatis interioribus late oblongis omnibus appendice ovata obtusa scariosa reticulato-nervosa onustis, corollis exsertis, achæniis cylindricis basi callosis 8-costatis pubescentibus, pappi setis aliquanto complanatis superne leviter dilatatis scabriusculis rubiginoso-stramineis paucis exterioribus ceteris brevioribus.

Hab. Belgian Congo, Lufongo on open plains; *Kassner*, 2845*a*.

Folia 18–23 × 3·5–6 cm.; exstant vero minora, in sicco brunneo-virescentia, subtus pallidiora ibique sub lente glandulis lucentibus pilisque brevibus sparsim inspersa; radicalia desunt. Corymbus 5 × 9 cm. Capitula 3·5 × 4 cm. Involucri phylla extima circa 10 mm., intermedia 15–20 mm., intima 25 mm. long. Corollæ tubus elongatus, angustus, apicem versus subcampanulatus, 27 mm. long., hujus pars amplificata 4·5 × 2·5 mm.; lobi oblongo-lanceolati, 4 mm. long. Styli rami vix 5 mm. long. Achænia fere 2 mm. long. Pappi setæ ext. ± 6 mm., ceteræ ± 10 mm. long.

This belongs to the group of species clustering round *V. insignis* O. & H. and *V. Calvoana* O. & H. The foliage and achenes are its chief peculiarities.

Vernonia (§ Stengelia) **Yatesii,** sp. nov. Verisimiliter fruticulosa ramis subtetragonis puberulis ramulis tenuibus pube cinerea densa obtectis mox puberulis, foliis parvulis oblanceolato-oblongis obtusis basi in petiolum brevem gradatim attenuatis margine apicem versus dentato-serratis firme membranaceis utrinque cito glabris vel fere glabris, capitulis pro rata parvis circa 25-flosculosis ad apicem ramulorum solitariis breviter pedunculatis pedunculis dense cinereo-pubescentibus, involucri campanulati phyllis circa 6-serialibus interioribus gradatim paullo longioribus oblongis humectatis crassiusculis appendice brevi herbacea oblongo-ovata acuta onustis araneoso-pubescentibus, corollæ tubo inferne attenuato superne dilatata, antheris basi acutis, achæniis oblongis 4–5-costatis glabris, pappi setis comparate brevibus paucis (circa 18) 2-seriatis inferne subpaleaceis superne attenuatis valde inæqualibus scabridis sordide albis.

Hab. Nupe, Nigeria; *C. C. Yates.*

Folia 1·5–2 cm. long., 4–8 mm. lat., in sicco olivaceo-nigra; petioli 3–5 mm. long. Pedunculi adusque 4 mm. long. Involucra 7 × 8 mm.; phylla intermedia 6 mm. long., 1·2 mm. lat.; horum appendix ± 2 mm. long., tenuia, difficile separabilia. Corollæ puniceæ, in toto 4 mm. long.; tubus inferne ·3 mm. superne fere 1 mm. lat.; lobi oblongi, obtusi, 1 mm. long. Styli rami 2 mm. long. Achænia 4 mm. long., in sicco dilute straminea, punctulis brunneis creberrime inspersa. Pappi setæ sæpissime 1·5–3 mm. long.

A curious little plant, with somewhat the look of a *Centratherum*, but without the caducous pappus of that genus. The involucral leaves are so closely appressed as to make it impossible to separate them in the dry state, and not easy when moistened. Relatively to the achenes the pappus is short for *Vernonia*, and its hairs are few and in the dry state stand close together; moreover, when moistened they diverge slowly until they are at right angles to the achenes, no doubt a means whereby the achene is anchored when it falls upon moist ground.

Under these circumstances I have doubts whether this should be placed in *Vernonia*, but I place it there provisionally, as there seems no more suitable genus to receive it.

(To be continued.)

MYCETOZOA FROM AROSA, SWITZERLAND.

By Gulielma Lister, F.L.S.

Arosa is in Canton Graubunden, about eight miles west of Davos. The village with its numerous hotels and sanatoria is finely situated at an altitude of 6000 feet, on the hillside high above the Plessur river, which flows north by a winding course to join the Rhine near Chur. The lower slopes of the steep valley are clothed with spruce woods; above, the trees give place to moist meadows, alpine pastures, and mountain heights where snow often remains throughout the summer.

The weather during the five weeks I spent at Arosa last summer was changeable. Three times heavy snow fell and covered all the land for a few days, when it was succeeded by rain and mist with intervals of brilliant sunshine.

While searching for Mycetozoa in the latter part of June, I found but scanty and weathered remains of such species as *Trichia varia*, *Cribraria macrocarpa* and *Lycogala* in the spruce woods. Later, when I had been joined by Miss Hibbert-Ware and Miss Schinz, the weather was more genial and we learnt the more favourable places in which to hunt. During the last week of July plasmodium was found emerging from stumps and prostrate trees in many parts of the woods.

On the alpine pastures, clumps of *Cirsium spinosissimum*, *Senecio alpinus* and *Aconitum Napellus* afforded good hunting grounds. Amongst the fresh young foliage were many of the previous year's flower-stalks, decayed and hollow within, which, when split open, usually showed the tracks of plasmodium that had chosen this sheltered situation in which to creep, feed, and often also to form sporangia. Here *Perichæna vermicularis* abounded. Higher on the hills, where patches of winter snow still lingered or had recently lain, on the sodden brown turf were found such species as *Physarum vernum*, *Didymium Wilczekii*, *Lepidoderma Carestianum*, and other cold-loving Mycetozoa.

The following is a list of the forty-eight species we found, one of which appears not to have been previously described.

CERATIOMYXA MUCIDA (Mueller) Macbr. Abundant during the last weeks of July on spruce logs. The typical form only was found.

Badhamia alpina, n. sp. Plasmodium pale yellow or yellowish white. Sporangia sessile, clustered or scattered, subglobose, or hemispherical on a broad membranous base, 0·5 to 0·9 mm. diam., grey, or dark brown and iridescent when without lime, usually seated on a dark horny layer of hypothallus over which are scattered deposits of lime-granules; sporangium-wall membranous, fragile, with or without scanty deposits of lime granules. Capillitium a dense network of slender tubes, expanded at the nodes, and containing scanty deposits of lime. Spores greyish-lilac, very faintly warted, 10 to 12 μ diam., average 11 μ. Found in some abundance on and inside hollow scapes of *Cirsium spinosissimum* and *Senecio alpinus*, above Arosa, 7000 ft. alt. This species closely resembles *B. foliicola* Lister, from which it is distinguished by the pale colour of the plasmodium, the more hemispherical sporangia, and the pale nearly smooth spores. From *B. panicea* Rost. it differs in the yellow not creamy white colour of the plasmodium, the much closer network of the often limeless capillitium, and paler spores; it differs also in the absence of any red colour at the base of the sporangium and of the strands of brownish-red hypothallus which usually characterize *B. panicea*. We had received previously three specimens of *B. alpina* from Graubunden gathered by Prof. A. Volkart, *viz.* one from Trimmis, at 5300 ft. alt., on herbaceous stalks, June, 1903, and two others from the Furstenalp at 5300 ft. and 6000 ft. alt. respectively, June, 1904, on dead raspberry twigs and old stalks of *Veratrum album*. M. Ch. Meylan has also gathered this species several times near Ste. Croix in the Jura Mts. A specimen found by Dr. R. E. Fries "*in regione subalpina,*" 2600 ft. alt., at Areskutan, Jämtland, Sweden, in August, 1905, appears also to be *B. alpina*. All these specimens we formerly regarded as forms of *B. foliicola* with unusually pale and smooth spores before we realized how constant this character is, and that it is associated with pale plasmodium.

BADHAMIA FOLIICOLA Lister. This first attracted our attention by numerous patches of bright orange plasmodium found creeping over twigs, fir-needles, grass and herbage under a spruce tree. By marking the spot we were able in a few days to collect fine clusters of the mature inconspicuous grey sporangia. The spores are violet-brown, 10 μ diam., and distinctly spinulose. This seems to be the first true record of the species for Switzerland, for in the light of our present knowledge the previous Swiss records should be referred to *B. alpina*.

Physarum viride (Bull.) Pers. One gathering only, on a spruce cone in the woods.

P. nutans Pers. A single specimen found in the hollow of a spruce stump.

P. fulvum (Macbr.) Lister. A cluster of about fifty sporangia was found on a pile of spruce boughs in a steep wood. Except for a gathering made by M. Charles Meylan on Le Chasseron, Jura Mts, last May, this alpine species has not been found out of N. America, where it appears to be rare. M. Meylan's specimen, part of which he kindly sent me, has more globose and sessile sporangia than the type from Colorado (figured in *Mycetozoa*, pl. 66); they vary from yellowish-buff to white, or are yellow below and white above; the lime-knots of the elastic capillitium are yellow and often unite to form a pseudo-columella. In the Arosa specimen the sporangia are obovoid on long or short yellow membranous stalks; some are yellowish-chestnut, others are bright yellow all over, or yellow below and white above where the wall breaks up into fragile lobes; the capillitium consists of an elastic network of yellow threads with numerous orange or orange-red angular lime-knots, containing irregular nodules of lime; the spores are rich brownish-purple, spinulose, 11–12 μ diam. This specimen shows a striking resemblance to *Leocarpus fragilis* Rost. both in the shape of the sporangia and in the capillitium and spores; but although the colour of the sporangia varies in both these species, the walls of *P. fulvum* are membranous and rugose with included deposits of lime-granules, and show nothing of the polished cartilaginous layers characteristic of *Leocarpus fragilis*.

P. vernum Somm. On *Cirsium* scapes.

Fuligo septica (L.) Gmelin. One weathered æthalium found on a spruce stump.

Diderma niveum (Rost.) Macbr. Found in abundance, but mostly in a weathered condition, on turf near melting snow.

D. Trevelyani (Grev.) Fries. Two clusters found on *Cirsium* scapes on the alps. The sporangia show no trace of columellæ.

D. radiatum (L.) Lister. A curious development consisting of a dozen brownish-buff sporangia was found on a chip of spruce wood. They are sessile or on very short flesh-coloured stalks, or form short curved plasmodiocarps. The lime-granules are dissolved from the cartilaginous sporangium-walls which are marked with the cavities where the granules lay; the columella is hemispherical, the capillitium colourless, and the spores purple-brown, 8 to 11 μ diam. I have since received specimens of typical stalked *D. radiatum* gathered at Arosa in August by the Hon. Terence Bourke.

Didymium difforme (Pers.) Duby. Both large and small plasmodiocarps were found in many places on the alps on dead *Cirsium* stalks.

D. Wilczekii Meylan. This alpine species was found abundantly on the alps, and showed great diversity of form. The largest gathering was on dead scapes of *Aconitum Napellus* at an elevation of about 8000 ft. near the Altein Furka Pass; it consisted of some hundreds of sporangia clothed with flat discoid scales formed of closely cohering crystals of lime. A remarkable variety was obtained on the Ochsenalp. The specimen consists of two depressed plasmodiocarps, about 13 mm. long; the superficial crystals form a continuous crust, and are easily brushed off from the glossy purple-brown sporangium-wall; a columella is represented by the thickened spongy base of the plasmodiocarp; the spores are unusually large, 13–16 μ diam., purple-brown, closely and minutely spinulose. The most striking feature is the capillitium, the threads of which are pale purple, sparingly branched, about 2 μ diam., marked with a few dark bead-like thickenings, and also with three to four slender close-set spiral bands; these either wind smoothly round the thread, or together form a prominent spiral: the direction of the spiral is similar to that on the elaters of *Trichia*. We have been accustomed hitherto to regard the development of spiral bands on the capillitium as a character of generic importance, found only in the Calonemeæ division of the Mycetozoa. It is, therefore, rather disconcerting to have perfectly regular spiral bands formed on all the capillitium threads of this *Didymium* which in every other respect resembles *D. Wilczekii*.

Lepidoderma Carestianum Rost. A few thick-walled plasmodiocarps were found on turf near melting snow, and on *Cirsium* scapes. The capillitium of one specimen shows an unusual structure; the threads are pale yellow, simple below, branched above, and consist of a central strand surrounded by a sheath broken up into long or short segments; such a structure usually occurs in the capillitium of *Colloderma*, but I have not seen it in any other species.

Colloderma oculatum (Lippert) G. Lister. On decayed spruce stumps, on both sides of the Plessur valley. Fragments of mossy wood with sporangia were brought back to England and kept moist under a bell-jar for four months, during which time fresh sporangia continued to appear at one point or another over the surface. Besides a growth of moss the wood was coated with a gelatinous green alga, with which *Colloderma* is usually associated. Through the alga the plasmodium emerges as scattered sulphur-yellow beads, which soon secrete a gelatinous envelope; in many cases the mature sporangium pushes out through this envelope, enclosed only by a delicate iridescent membrane which readily breaks and allows the spores to be scattered.

Stemonitis fusca Roth. On spruce logs.

S. ferruginea Ehrenb. On spruce logs, found only in a weathered condition.

S. HERBATICA Peck. On a spruce log, weathered.

COMATRICHA NIGRA (Pers.) Schrad. Fairly abundant on fallen spruce boughs.

C. TYPHOIDES (Bull.) Rost. var. HETEROSPORA Rex. On a spruce stump.

LAMPRODERMA VIOLACEUM (Fr.) Rost. var. CARESTIÆ. Rather abundant on and inside hollow *Cirsium* scapes. The sporangia are all shortly stalked, some are globose, others are ovoid; in one group of sporangia the sporangium-walls may either persist in large flakes, or break up into fragments adhering to the tips of the capillitium: the capillitium forms a dense intricate network, and is purplish-black except at the extreme tips, which are colourless; the spores are very minutely spinulose and either very dark grey, slightly pale on one side, 11·5 to 14 μ diam.; or, in one gathering, they are pale grey, 10 to 12 μ. These specimens differ, M. Meylan tells me, from his *L. atrosporum* by the capillitium being too dense; in *L. atrosporum* the spores can be freed from the sporangia at a breath.

ENERTHENEMA PAPILLATUM (Pers.) Rost. On decaying stumps.

CRIBRARIA AURANTIACA Schrad. On rotting spruce logs.

C. MACROCARPA Schrad. Abundant. On one tall stump the sporangia extended over an area of several square feet, but were old and mouldy.

C. PURPUREA Schrad. Found on the same stump as the large growth of *C. macrocarpa*. The sporangia measure about 3 mm. in total height; they are old, and have turned a dull crimson. A similar change from the typical reddish-purple colour to crimson has taken place in a few sporangia of a large gathering kindly sent me from the Jura Mountains by M. Meylan.

C. RUBIGINOSA Fries. A fine but weathered development was found on a spruce stump. The sporangia measure from 3 to 3·5 mm. in total height: the deep cups are marked below with numerous, close-set oblique or curved lines of thickening, and above with a close reticulation; the sporangium-walls seem to be persistent throughout. In *Mycetozoa*, ed. 2, p. 177, the specimen from Berne, quoted under this species, should be referred to M. Meylan's new species *C. ferruginea*.* This differs from *C. rubiginosa* in the more piriform shape of the sporangia, in the shallow cups being marked with about twenty strong ribs, and in the rusty-red spores. The colour of the spores is the chief character that distinguishes *C. ferruginea* from *C. macrocarpa*.

DICTYDIUM CANCELLATUM (Batsch) Macbr. var. ALPINUM. Found in several places on stumps. The largest growth covered an area of three square inches on the under side of a spruce log: the sporangia are erect or inclined on stout stalks 2 mm. high: they resemble typical var. *alpinum* in having only twenty to thirty ribs to the sporangial net, but differ in the colour of the ribs being deep red instead of brown; in some sporangia the ribs branch and anastomose to form a *Cribraria*-like net, in others the ribs send off oblique branches on either side, as in Schrader's illustration of *Dictydium venosum*.*

---

* See *Annuaire du Conservatoire et du Jardin botanique de Genève*, 1913, p. 319.

LICEA FLEXUOSA Pers. Found developing from rosy plasmodium and also in a mature condition on spruce stumps and boughs.

L. MINIMA Fries. Abundant on a few much decayed spruce stumps. The sulphur-yellow plasmodium continues to emerge and form sporangia for some days over the same area of wood, so that one may find all stages of growth intermixed, varying in colour from yellow to bright chestnut or brownish-black. The dark granules dotted over the inner surface of the margins of the lobes of the sporangium walls are not free "plasmodic granules" such as we see in *Cribraria*, *Dictydium* and *Lindbladia*, but prominent, often irregular warts or outgrowths from the walls themselves.

L. PUSILLA Schrad. Fairly abundant on decayed spruce stumps. The colour of the emerging plasmodium is watery drab. I am not aware that this has been recorded before. When the sporangia are still young and pale the outlines of the areolæ and lobes into which their walls will ultimately divide are clearly defined as a net of dark lines. This species can be distinguished from *L. minima* in the field by the spores being black instead of a reddish-brown colour in mass.

TUBIFERA FERRUGINOSA Gmelin. A cluster of sporangia was found emerging from a spruce stump in pinkish-yellow plasmodium, which matured indoors.

LYCOGALA EPIDENDRUM (L.) Fries. On spruce stumps.

TRICHIA FAVOGINEA (Batsch) Pers. Abundant on spruce logs and stumps. The elaters in some sporangia have the spiral bands replaced partially by ring-shaped thickenings.

T. SCABRA Rost. Two large developments were found on spruce logs.

T. PERSIMILIS Karst. On spruce stumps.

T. VARIA Pers. Abundant on wood.

T. CONTORTA (Ditm.) Rost. var. ALPINA. On *Cirsium* scapes.

T. DECIPIENS (Pers.) Macbr. On spruce stumps.

T. BOTRYTIS Pers. On spruce logs and stumps.

HEMITRICHIA KARSTENII Rost. A group of brown sporangia was found on a heap of spruce boughs.

H. ABIETINA (Wig.) Lister. On decaying spruce. The bands on the capillitium are two or three, arranged in a loose spiral, and often interrupted by ring-shaped thickenings.

H. LEIOTRICHA Lister. A single shortly-stalked sporangium was found on a chip of spruce wood. The structure of the sporangium-wall with its comma- or ring-shaped thickenings and deposits of olivaceous refuse matter and the colour and markings of the spores are typical. The capillitium is remarkable in having the spiral bands on the threads running in the reverse direction from that in *Trichia*, i. e., they pass from the right below to the left above when the thread is seen horizontally. This is the first instance that I have seen of reversed spiral bands in any species of the Mycetozoa; the nearest approach is in *Oligonema flavidum* Peck, where the rows of minute warts that are studded over the capillitium are often arranged to form rows passing round the threads in the reversed spiral direction. Of the cause or possible significance of such a reversal we know nothing. Its exceptional occurrence draws our attention to the constancy with which the usual type of spiral occurs.

---

* See *Nova Genera Plantarum*, pl. iii. fig. 6.

Arcyria denudata (L.) Sheldon. A large development of crimson sporangia was found on a decaying spruce log.

A. incarnata Pers. Developed indoors from white plasmodium found on a spruce stump.

A. nutans (Bull.) Pers. Found emerging as a mass of creamy-white plasmodium from a spruce stump, and matured indoors. It was probably slightly injured when it was cut off the stump, for, although the spores are normal, the capillitium is irregular, varying from 5 to 8 μ diam., and studded all over with stout conical spines.

Perichæna vermicularis (Schwein.) Rost. Abundant on and inside hollow *Cirsium* scapes on the alps. The slender buff sporangia form simple or net-like plasmodiocarps; the plasmodium, instead of being watery-white, as we had previously seen it, is rosy-red; the veins of bright red sclerotium were conspicuous when the stalks were split open and examined.

Margarita metallica (Berk. & Br.) Lister. Found twice on spruce wood; the sporangia were either solitary or clustered.

Dianema corticatum Lister. Fairly abundant on decaying roots and stumps of spruce, both in the rosy plasmodium stage and as mature sporangia.

Prototrichia metallica (Berk.) Massee. Two sporangia found on decaying spruce roots; both are brilliantly iridescent and mounted on brownish-yellow stalks about 1 mm. high; the colour of the spores in mass is olive-brown, instead of the usual pink or brownish-pink of freshly formed spores.

After we left Arosa, the Hon. Terence Bourke and Miss Jasmine Bourke kindly sent me collections of Mycetozoa made there by them during the month of August.

Of the fifteen species which they found, the following five had not been seen by us at Arosa, *viz.* :—

Leocarpus fragilis (Dicks.) Rost.

Didymium melanospermum (Pers.) Macbr.

Comatricha typhoides (Bull.) Rost. The typical form.

Cribraria piriformis Schrad Several developments of perfectly developed sporangia, with spores varying in colour from bright reddish-brown to purplish-brown when seen in mass.

Arcyria ferruginea Sauter.

TWO HEPATICS NEW TO BRITAIN.

By W. E. Nicholson.

During the autumn of 1912 I found in several stubble fields in the neighbourhood of Lewes a small species of *Riccia* which generally had some traces of violet colouring about it and was most frequently ciliate. It bore some general resemblance to *R. Warnstorfii* Limpr., but it seemed constantly different in the more compact rosettes with shorter wider branches. This seemed to point to *R. commutata* Jack, and on my submitting the plant to Dr. Schiffner, he confirmed it as that species, remarking that it was rather more compact than the plant from the original locality and that from Dalmatia, but that this might well be accounted for by the habitat, as morphologically and in the spores it agreed well with these. *R. commutata* is no doubt closely allied to *R. Warnstorfii*, and the differences may to some small extent be accounted for by differences in the habitat of the two species, *R. Warnstorfii* being perhaps more frequently found in lighter soil than *R. commutata*; but, on the other hand, the differences are retained on the cultivation of both species in the same soil. In Sussex the two species sometimes grow in the same field, and Mr. H. H. Knight has found the same thing in Gloucestershire. On the Continent *R. Warnstorfii* is credited with a northern range, being principally recorded from Northern Germany, while *R. commutata* has a distinctly southern distribution. Both plants will probably be found to have a much wider distribution in Britain than is at present suspected. In the autumn of 1912 *R. commutata* was much more abundant in Sussex than *R. glauca*, with which it might perhaps be confused in the younger stages, though if transverse sections be cut of mature fronds of the two species there is no possibility of mistaking one for the other. The following diagnosis, largely borrowed from that of Dr. K. Müller, may be of use in distinguishing the plant (K. M. Mus. Hep. 1 Abt. p. 191).

Monoicous. Thallus small, dark vivid green, rarely reddish, flat, two or three times forked, 2–7 mm. long and 1–1·5 mm. broad. Branches linear, oval or ovate with margins here and there stained with red, usually inserted almost rectangularly, truncate to emarginate at the ends, with or without marginal cilia and with a narrow channel only at the ends of the branches; further back the upper side of the thallus is convex. Frond section one and a half to three times as broad as thick, ellipsoid in the older parts with rounded margins wider towards the apex, slightly convex below, flat above with a short obtuse sinus and bow-shaped towards the sides. Cells of the epidermis thin-walled, spherical, without mamilla. Ventral scales colourless or reddish violet, soon disappearing. Ostioles rising slightly above the upper surface of the thallus. Spores brown 80–85 μ with a distinct yellow and notched margin, closely papillose, areolæ consequently indistinct, 8 μ wide, 6–8 visible in the diameter of the spore.

Habitat. East Sussex over a wide area; East Kent (*E. M. Holmes*), West Gloucestershire and Worcestershire (*H. H. Knight*).

Dr. Müller describes a var. *acrotricha* Lev. with marginal cilia, but I have generally found a few cilia on the Sussex plant when freshly gathered. These frequently disappear when the plant is cultivated under moist conditions, but they reappear when the plant has finished its growth or is cultivated under drier and more exposed conditions. I am inclined therefore to regard the presence of cilia in this species as a normal feature of the plant, representing a state in the life of the individual frond rather than a true variety. The Sussex plant is rarely of a vivid green except when growing under very moist conditions; most frequently it is of a rather pale glaucous colour, recalling that of *R. glauca*, though it usually has some trace of violet both in the frond itself and the ventral scales. It is probable that some of the plants which I referred to the var. *subinermis* of *R. glauca* in the past may have belonged to the present species.

The other plant, also rather a critical form, is a species of *Fossombronia*, which I gathered in Babbacombe Bay, near Torquay, in March, 1913. I noticed in the field that the plant had a rather stout stem, strongly convex on the under side with hyaline or, occasionally, brownish rhizoids, unlike the violet rhizoids of all the described British species, and the microscope revealed the fact that the papillæ on the spores, which were otherwise like those of *F. cæspitiformis*, showed an occasional tendency to anastomosis, so as sometimes to make the surface of the spore very irregularly areolate. These characters seemed to indicate *F. Husnoti* Corb., but on my submitting the plant to Mr. S. M. Macvicar he pointed out that the spores were considerably larger than those of typical *F. Husnoti*, 43–53 μ, as against 40–45 μ in that species, and that their surface was less distinctly areolate. These differences I was well able to observe by comparing my plant with a specimen of *F. Husnoti* from Florence, which I owed to the kindness of Dr. Schiffner. On my submitting the Babbacombe plant to Dr. Schiffner, he pronounced it to be certainly *F. Husnoti*, and he apparently attached considerable importance to the frequent presence of three spiral elaters. In view, however, of the departures from the type above noted I have ventured to describe it as a new variety:—

FOSSOMBRONIA HUSNOTI Corb. var. ANGLICA. *A F. Husnoto differt sporis grandioribus ·043–·053 mm., papillis minus regulariter anastomosantibus foveolas paucas valde irregulares formantibus.*

Hab. Moist banks by the sea, Babbacombe Bay (*W. E. N.*), near Llandovery, S. Wales (*H. H. K*).

F. Husnoti and *F. cæspitiformis* are very closely allied species, and it might seem as reasonable to describe the present plant as a variety of the latter as of the former, but in a genus where the violet rhizoids are such a marked feature of the other European species, it seemed worth while to draw attention to a form with hyaline or brownish rhizoids, a feature which I have found maintained on cultivation of considerable material. The stem, moreover, is very strongly developed on its under side so as to make it rather more subterranean than in the other species, and no doubt the frequent presence of three spiral elaters is a character of some importance. I have, however, found this feature not infrequently present in Sussex forms of *F. cæspitiformis*, though it is less usual in forms from S. Europe.

SHORT NOTES.

PTILOTA PLUMOSA Ag. (p. 77).—For over forty years I have been the possessor of a fine and unmistakable specimen of *Ptilota plumosa* in my herbarium, which was sent me by the late Mr. Henry Goode, as collected by himself "near Falmouth, Cornwall, summer of 1871." I knew Mr. Goode only by correspondence, but was assured of his reliability and absolute sincerity, and as one who only distributed algæ of his own collecting, invariably off the coasts of S. Devon and Cornwall. I believe he passed away in the early eighties, at a good old age. His abode was near Plymouth. I may add that I have never myself found *P. plumosa* Ag. in any Welsh station save that of Path-y-Pistill, Holyhead, where in the summer of 1883 I found many most perfect and beautiful fronds, usually floating. I have searched in vain for it at Penluaen Mawr, Llanfairfechan, Llandudno, Barmouth, &c.—J. COSMO MELVILL.

VALERIANELLA ERIOCARPA Desv.—Referring to my notes as to the occurrence of this plant in the Isle of Wight (Journ. Bot. 1912, 231; 1913, 288), it may be worth recording that on this date (March 2nd) there are thousands of young plants in the same habitat, where in 1912 they were abundant, and where last year I could only find, after long searching, one or two plants. If the Botanical Exchange Club or any botanist would care to have specimens I would gladly dry some as soon as the plants are in fruit.—FREDERIC STRATTON.

ABERDEENSHIRE PLANTS.—*Mimulus moschatus*, reported (Journ. Bot. 1911, 370) as being found by me in Haughton Wood, Alford, Aberdeenshire, is increasing greatly since that date.—*Linaria repens* still grows at Auchindoir, Aberdeenshire (whence it is recorded in Dickie's *Guide* (1860)), where there was once a cottage garden. The stems attain the length of three feet. Cattle had eaten the longest stalks overhanging the dyke, before I (in August last) took careful measure.—WILLIAM WILSON.

POLYPORUS SQUAMOSUS.—Some very early fruit bodies of *Polyporus squamosus* have appeared recently in the "Backs" at Cambridge. My attention was called to one of these by Mr. Maltby; this was a fructification produced inside the hollow trunk of an elm in St. John's College Backs. On further examination of trees, other fructifications were found—several on a horse chestnut near the elm tree, and three or four more on an old elm stump (behind King's College) which was known to be badly infected with the fungus. The fructifications appeared in all probability during the second part of February, and were past maturity in early March. Generally they were rather small. The usual period for the fructification to appear is from May to September, as reported by Buller. I have, however, recorded fructifications in the Cambridge district as late as the middle of November and now as early as February. The winter has of course been mild in Cambridge.—S. REGINALD PRICE.

REVIEWS.

A Flora of Norfolk with Papers on Climate, Soils, Physiography and Plant Distribution, by Members of the Norfolk and Norwich Naturalists' Society. Edited by W. A. NICHOLSON. Demy 8vo, cloth, 214 pp. 2 maps. Price 6*s.*

MR. KIRBY TRIMMER'S *Flora of Norfolk* was published in 1866; it was never a satisfactory book and has been for many years out of print, and the Norfolk and Norwich Naturalists' Society has done well to prepare a new one. Mr. W. A. Nicholson had for some years been collecting material for such a work, and the Society acquired his MSS. which, "with much additional information compiled from the work of botanists, resident and non-resident," is now issued in a neat volume.

The book, so far as one who is practically unacquainted with the county is at liberty to express an opinion, is very carefully done. The small (though clear) type employed enables the volume to appear in a more pocketable form than is usual in similar works, and there is an absence of the irrelevant matter which sometimes finds its way into local floras; space has been saved, too, by a free but intelligent use of abbreviations. The scattered records in this Journal and elsewhere seem to have been carefully swept up. The four districts into which the county was divided by Mumford in his list in White's *Directory*—date not stated—and adopted by the Society in 1869 is followed here; a brief account is given of their characteristics. The other important matters indicated in the title are duly discussed at reasonable length; there has evidently been a commendable desire not to be prolix or discursive.

We regret, however, the absence of what has become a prominent—sometimes too prominent—feature in our local floras—some account of the history of the botany of the county and of those who have taken part in its investigation. Such an account adds not only to the value but to the interest of the book; and Norfolk has been so especially favoured by botanists that the omission is the more to be regretted: J. E. Smith, W. J. Hooker, Dawson Turner, among illustrious names; Pitchford and Crowe among those who grew and studied Willows, as was fashionable in botanical circles towards the end of the eighteenth century. A glance through the *Biographical Index of Botanists* will reveal many more, including some about whom information is badly wanted, which should have appeared in the roll-call of botanists which we expect to find in a local flora. We also miss the descriptive and critical notes which often lend more than a local value to works such as this, and which indicate observation of a higher type than that which a mere record conveys.

We note the presence of a considerable number of names in local use, and the omission of the more absurd of the "book-names" which—*e.g.*, in *Carex*—often disfigure books of this class. We are glad, too, that all the names, whether Latin or English, are placed in one index. Nor must we omit to mention what is evidently a very full and careful list of Mosses and Liverworts prepared by Mr. W. H. Burrell, with the assistance of Mr. H. N. Dixon; the Fungi are altogether omitted. There are two excellent maps.

It will be seen from what has been said that we have in Mr. Nicholson's book a solid though not an exciting contribution to our knowledge of British local botany—a knowledge the gaps in which are being steadily filled up.

Pflanzenphysiologie: Versuche und Beobachtungen an höheren und niederen Pflanzen einschlusslich Bacteriologie und Hydrobiologie mit Planktonkunde. By R. KOLKWITZ. Jena: Gustav Fischer. Pp. 258. 12 coloured plates, 116 text figures. 9 Mark.

THE present work has grown from the author's *Pflanzenphysiologische Versuchen zu Übungen im Winter*, published in 1899, and is a course of physiology arranged for the students of the Berlin University and the Agricultural Academy. The first part, consisting of sixty pages, deals with the nutrition of the higher plants—chlorophyll and its functions, turgidity and osmosis, sugar and reserve food material, proteins, respiration, water and air. The experiments are well-devised, though most of them are familiar; the exposition is clear and reference is made to recent literature. The principal part of the book deals with Cryptogams. After a description of the microscope and its accessories, the various phyla are considered in order, beginning with the Myxomycetes and ending with the Ferns. Much of the matter cannot be said to be physiological in the ordinarily accepted sense of the term. Methods of collection, culture, and examination, as well as a description of the habitat, are given where possible. The physiological significance of various processes in the life-history is well described in many instances. The most interesting portion of the book is the section "Algen, Plankton und Ökologie der Gewässer," as was to be expected, seeing that the author is a recognized authority in hydrobiology. The short descriptions of many plants might have been left out with advantage. In some cases the cryptogams so treated are commonly met with in the neighbourhood of Berlin (and of London) and might therefore claim place, but *Sargassum*, *Macrocystis*, &c., seem out of place in such a book. This portion of the work would prove an excellent introduction to the study of cryptogamic botany. The book is unique in the stress which it lays upon the cryptogamic section of the plant world, a section known principally in many of our English "schools" through the intricacies of the vascular anatomy of Pteridophytes—present and past. It is well printed and well illustrated.

J. R.

Icones Orchidearum Austro-Africanarum Extra-tropicarum; or, Figures with Descriptions of Extra-tropical South African Orchids. By Harry Bolus, F.L.S., Hon. D.Sc. (Cape). Volume iii., demy 8vo, tt. 100, with text. Wesley. Price £1 10*s*. net.

It is satisfactory to learn that the late Mr. Bolus's important work is to be carried on by Mr. H. M. L. Bolus, the Curator of the Bolus Herbarium. The present volume was apparently left in MS. by the author of the preceding instalments, as his name alone appears on the title-page, and the preface, while acknowledging the help of Mr. F. Bolus, who has drawn nine of the plates and made additions of various kinds to others, makes no reference to any collaborator in the literary portion.

Of the plates in the volume before us, 36 have already appeared in the author's *Orchids of the Cape Peninsula*, which is now out of print. Among the genera represented, *Disa* has 36 plates, *Satyrium* 12, *Disperis* and *Pterygodium* 11 each; the other genera included are *Acrolophia*, *Eulophia*, *Angræcum*, *Bartholina*, *Huttonæa*, *Holothrix*, *Habenaria*, *Brachycorythis*, and *Ceratandra*. The descriptions correspond with those of the previous volume noticed in this Journal for 1912 (p. 28). There is a new species of *Holothrix*—*H. Reckii*, named after its discoverer and sole collector; and a hybrid—*Satyrium coriifolium* × *carneum*—described from three living specimens, found growing widely apart, but always among the parent species.

Floral Evolution: with Particular Reference to the Sympetalous Dicotyledons. By H. F. Wernham, B.Sc. *New Phytologist* reprint, No. 5. Pp. viii + 151. Price 3*s*. Cambridge: at the Botany School.

The above work is based upon a course of lectures delivered by Mr. Wernham at the Chelsea Polytechnic in the summer of 1910, and was published in its present form in the pages of the *New Phytologist*. The author states that his purpose has been to give a connected account of one of the larger groups (namely, the *Gamopetalæ* or *Metachlamydeæ* or *Sympetalæ*) of flowering plants, with continual reference to a definite evolutionary story, having for its *motif* a few broad biological principles applicable to the phylogeny of the Angiosperms generally. "In the endeavour to preserve the continuity of this evolutionary story, it has been necessary to hasard suggestions of affinities and lines of descent which may be by no means generally acceptable; and the student is warned that in such cases the suggestions are purely tentative."

Mr. Wernham's primary contention is that the *Gamopetalæ* are polyphyletic in origin; and on this matter the reviewer is in full sympathy with the author. Many botanists have put forward more or less detached suggestions to the same effect; but none perhaps has stated the case more whole-heartedly. At the same time, the reviewer confesses that some of the particular suggestions of affinities are regarded in the light of the author's warning of their purely tentative nature.

The work is very readable and very well written, and Mr. Wernham has performed a useful service in drawing the attention of botanists to a department of their science which, in these days of callunetums and heterozygotes, is too apt to be altogether forgotten. We are bound to confess, however, that the methods of study of floral morphology have not kept pace with the development of technique in other branches of botany. In early and mid-Victorian days researches on the morphology of the parts of the flower were not unfashionable; but since the microtome came into vogue there has been a great falling off in work of this character. Yet it is undoubtedly the case that many of the problems discussed in *Floral Evolution* are incapable of solution without assistance from the microtome and all its concomitant paraphernalia. The reviewer looks forward to the time when problems of floral morphology will once more become a vogue, and when modern methods of research will be applied to this branch of botany, which is at once most interesting and most important from the evolutionary point of view.

C. E. M.

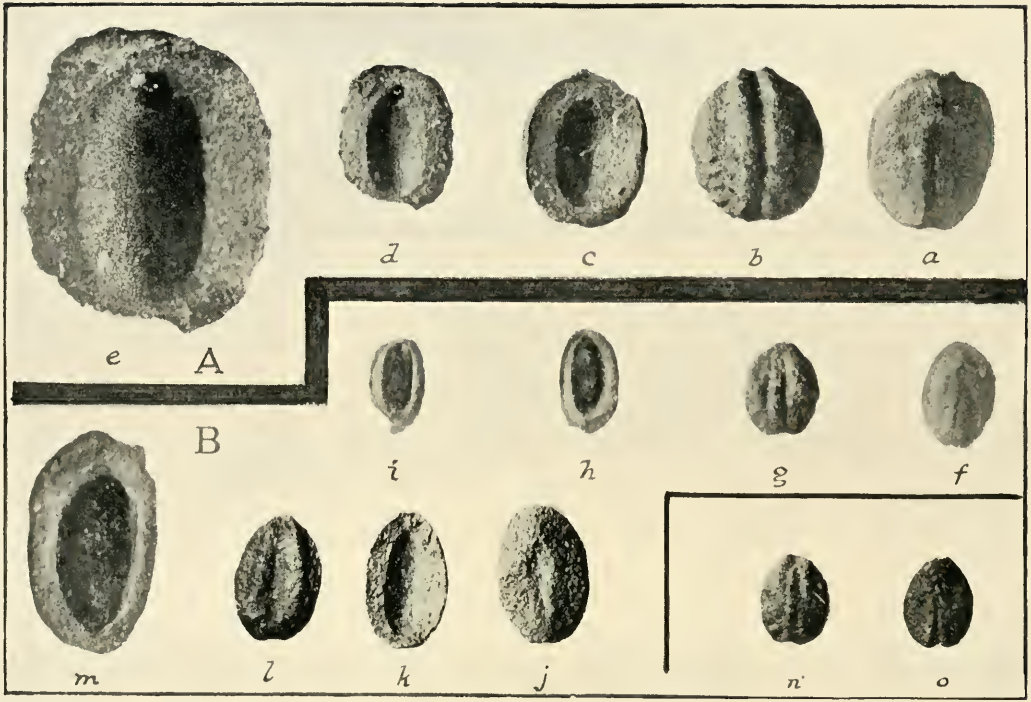
BOOK-NOTES, NEWS, &c.

We are glad to see that the *Times* is taking up the question of the extermination of primroses near London, and indeed further afield; an article published in its columns for March 13 is followed by a letter from Mr. H. Rowland-Brown, of Harrow Weald, who writes:—"For something over forty years I have watched the annual invasion of the tramp dealer in our woods here, and along the once exquisite Middlesex lanes in which, also, the wild hyacinth flourished abundantly, and the nightingales sang in the high hawthorn hedges. Primroses, hyacinths, high hedges, and nightingales are now all gone from the lanes, and every Sunday in the season motors bring down troops of indiscriminate 'collectors' to harry the few remaining beauty spots in the woods left by the itinerant vendors, for whom at least there is some intelligible excuse. I have seen half-a-dozen cars drawn up by the roadside by a tiny copse known from my childhood as 'the Bluebell Place,' and immortalized as such on the canvas of English painters. A few years more, and—the wood being no longer preserved for game—the hyacinths will have followed the primroses; for the most distressing feature of the work of destruction is to be seen upon the road itself strewn with broken spikes of bloom, and bulbs dragged up by the greedy picker, to whom locked gates and thorn hedges offer no obstacle sufficient. It is just the same with the willow 'palms'—flowering this year happily too soon, at least for the Easter holiday crowd—every bush on the common, every branch by the way broken down and disfigured as high as hand may reach." It is many years since we expressed surprise that the Selborne Society had not made its influence more felt in the matter of plant preservation: the formation of an influential "Plant Protection Section" is an important step in the right direction, but so far we are not aware that any definite results have followed: meanwhile the question becomes yearly of greater urgency. Mr. Brown concludes his letter by an appeal to "the local authority," which might, we would think, at least control or modify the efforts of the roadmen who throw upon the roadside turf the parings and hedge trimmings they annually remove, leaving them there to destroy what yet remains of grass; and who scrape the hedge banks and hedge bottoms to the great benefit of the nettles, which profit by the destruction of other plants and usurp their place, to the great detriment of the charm of the countryside.

The volume on *Wild Flowers* which is contributed by Mr. Macgregor Skene, B.Sc., to Messrs. Jacks' series of "People's Books" is arranged according to colour—a scheme which is doubtless intended to save trouble in identification, but which can hardly be considered scientific. Nor are we sure that it attains its object, for folk see colours very differently—we should not ourselves class Red Campion as purple or Water-Plantain as rose; nor is it easy to see why Bladderwort is placed among "flowers rarely found or very inconspicuous," seeing that it is described as "fairly common" and the flowers as "large yellow." Mr. Skene recommends Babington's *Manual* and Bentham and Hooker's *Handbook*, but omits Hooker's *Students' Flora*, which is more useful than either. As a companion to the *Handbook* he recommends "*Smith's Illustrations of the British Flora*"; by this is intended the volume of figures by Fitch, prepared for the illustrated edition of Bentham's earlier *Handbook* (which Bentham and Hooker's replaced), which were issued as a separate work, with supplementary figures by Mr. W. G. Smith, in 1880: from this are taken the numerous excellent illustrations in Mr. Skene's book, which form its most attractive feature. The descriptions are careful and accurate and the volume is a wonderful sixpennyworth.

The February number of the *Journal of Genetics* contains a "Preliminary Note on the Genetics of *Fragaria*," which includes experiments with *F. vesca* and notes on garden hybrids; it is illustrated with one plate and cuts. Mr. E. S. Salmon writes "On the Appearance of Sterile 'Dwarfs' in *Humulus Lupulus*," with two plates. The other papers deal with zoological matters.

Corrections.—In our last issue, p. 72, line 8 from bottom, "not" should be inserted before "hitherto"; on p. 86, line 14 from bottom, the words "of Cambridge (not Dublin, Mr. Wilson!)" should read "of Dublin, formerly of Cambridge."



A. Corema alba (*Linn.*). Endocarps enlarged $\frac{6}{1}$ and $\frac{12}{1}$. Recent. Portugal.
a = ventral face; *b* = dorsal face; *c*, *d* = interior; *e* = enlargement of *d* to show testa and aperture.

B. Corema intermedia, sp. nov. Endocarps enlarged $\frac{6}{1}$ and $\frac{12}{1}$. Pliocene.
f–*l* = fossil, Cromer Forest-bed, *i* showing aperture; *m* = enlargement, showing testa; *n*, *o* = fossil, Holland.

A NEW FOSSIL COREMA.

By Clement Reid, F.R.S., & Eleanor M. Reid, B.Sc.

(Plate 531.)

The *Empetraceæ* form so small an order, with only three genera and about six species, that the discovery of a new species fossil in Britain is worth recording. The fruits in question were found by us in 1904 in the pre-glacial deposits of Pakefield, in Suffolk. Their curious shape and mode of attachment made us then refer them to some unknown species of *Viburnum*, and as such they were described in 1908.* The great difficulty in cutting sections of these pyritised fruits from the Cromer Forest-bed made us also less careful to examine their internal characters than we should have been.

A few years after the discovery of the Pakefield specimens two endocarps belonging to the same plant † were found at Tegelen, in Dutch Limburg, in deposits somewhat more ancient than those of Pakefield, and probably of about the age of our Norwich Crag. These also were figured by us as belonging to this unknown species of *Viburnum*.

The study of a still older Pliocene flora in Dutch Limburg, with many fruits and seeds belonging to unknown genera, has lately necessitated the systematic examination of the flora of the Palæarctic Region, as represented by the fruits and seeds in the Kew Herbarium. In the course of this work we came across the small genus *Corema*, and were at once struck by the resemblance of its endocarps to our unknown fossils. A close comparison of the recent fruits with our fossils left no doubt whatever that they belong to the same genus, though the fossils represent an extinct species. This *Corema* happens also to be the first extinct plant that has been recognized in the Cromer Forest-bed, though several other plants found in that deposit no longer live in Britain.

Of the two living species of the genus, the one nearest our fossil, *C. alba*, is found on the coast of Portugal and Spain, and in the Azores. The other, *C. Conradi*, belongs to the coastal region of the New England States in North America.

Thus not only does our fossil show a former wider distribution of the genus, but it is the first plant now specially belonging to the Atlantic province to be found fossil in the North Sea basin.

As regards the conditions under which the extinct *Corema* grew, we can only say that the two deposits in which it has been found were both in all probability laid down as river alluvium within a few miles of salt water. This would agree with the habitat of the two living species, both of which are confined to coastal regions.

---

* *Linnean Society's Journal*, Botany, xxxviii. p. 215, figs. 75–77.

† *Verslagen Kon. Akad. Wet. Amsterdam*, 1910, p. 267, figs. 30, 31.

Corema intermedia, sp. nov. *Planta* fossilis nisi fructus ignota. *Drupa* . . . endocarpiis 3, longit. 2·2–2·5, latit. 2·0–2·5 mm.; monospermis ovatis osseis extus incrassatis, dorso irregulariter costatis, facie canaliculatis. *Testa* tenuis membranacea alveolata, alveolis irregulariter transversis.

Endocarps 3, ovate, hard, bony, thick-walled, irregularly ribbed longitudinally on the dorsal surface, channelled on the ventral face and facetted at an angle of about 120°. Seed with a thin membranous testa with cells arranged in irregular zigzag transverse lines. Length of endocarps 2·2–3·0 mm.; breadth 2·0–2·5 mm.

In size our endocarps are midway between those of *C. alba* and *C. Conradi*. In shape they resemble *C. alba*, though they are considerably smaller, more ovate, and less tumid. To *C. Conradi*, which has minute fruits, they bear little resemblance. The very peculiar cells of the membranous adherent testa are like those of *C. alba*, but the adhesion of this testa to the endocarp makes it difficult to examine in the fossil, and we have been unable to photograph its very characteristic structure, though this can be seen in places in the interior of the specimen shown in fig. *m*.

NOTES ON BRITISH PLANTS.

By C. E. Moss.

II. Ranunculus obtusiflorus.

It seems to be generally admitted by modern systematic botanists that *Ranunculus baudotii* Godron (1839)* and *R. confusus* Godron (1848) should be reduced to a single species. They were, in fact, so reduced by Syme (1863), by Sir J. D. Hooker (1884), and by Rouy & Foucaud (1893). Syme united Godron's two plants under the name *R. baudotii*, and gave each a varietal name: *R. baudotii* Godron became *R. baudotii* var. *vulgaris* Syme (1863); and *R. confusus* Godron became *R. baudotii* var. *confusus* Syme (1863). Hooker named the same aggregate species (i. e., *R. baudotii* Godron ampl. Syme) *R. marinus*, and mentioned that he could not verify the characters of the varieties as constant. Rouy & Foucaud used the same aggregate name as Syme, and reduced *R. confusus* Godron to a subspecies. Mr. N. E. Brown (1891) also expressed the opinion that *R. baudotii* Godron and *R. confusus* Godron are only forms of one and the same species.

This aggregate species (*R. baudotii* Godron ampl. Syme) has a west-European and Mediterranean distribution; but it is not so markedly Atlantic in its range as the allied species *R. homiophyllus* Tenore, 1830 (= *R. lenormandi* Schultz 1837), *R. tripartitus* DC. (1808), and *R. hololeucus* Lloyd (1844): this last is not known to be a British plant; but one feels that it must occur in southern England, or at least in the Channel Islands.

---

* Full citations are given later on in this note.

Apparently western Europe is exceptionally rich in species of Batrachian Ranunculi.

In choosing the name *R. baudotii* for his aggregate species, Syme passed over an earlier one, *Batrachium obtusiflorum* S. F. Gray (1821). It was, of course, customary in this country at that time to follow "the Kew rule"; and consequently Gray's name would have been ignored by Syme even if he had seen it, since it was placed in a different genus. There was also the name *R. tripartitus* Nolte (1826) to consider; but this name was pre-occupied by *R. tripartitus* DC. (1808) for another legitimate species.

Gray's plant (*B. obtusiflorum*) was founded on *R. tripartitus* var. *obtusiflorus* DC. (1818), and de Candolle's variety, in its turn, on an illustration by Petiver (*English Herbal*, t. 39, fig. 1, 1713). This plant of de Candolle's was an addition to the *R. tripartitus* DC. (1808) which became *R. tripartitus* var. *micranthus* DC. (1818).

It is clear that *R. tripartitus* var. *obtusiflorus* DC., being founded on one of Petiver's plants, is British; and I am satisfied that Petiver's figure must be referred to *R. baudotii* Godron ampl. Syme. It is equally clear that Gray's plant is the same as de Candolle's var. *obtusiflorus*, and therefore that Gray's trivial name (being the earliest) must be utilised for Syme's aggregate species; and this is the *but* of the present communication.

Godron, when founding his *R. baudotii*, remarked that the plant showed a closer affinity with *R. tripartitus* DC. than with *R. aquatilis* L. emend.;* and it certainly is the case that it is an interesting connecting link, as regards both its characters and its distribution, between the two species *R. tripartitus* DC. and *R. aquatilis* L. emend. On the whole, it seems justifiable to retain these as three distinct species, as is done by Hooker fil. and by Rouy & Foucaud. There seems to be a real (though a small) gap between each of them; and if they are not kept as separate species, the resulting aggregate becomes so unwieldy that more confusion is caused by their union than by their separation. In particular, the interesting distribution of the segregate forms becomes lost sight of or at least obscured.

As to the subdivisions of Syme's aggregate *R. baudotii* (or *R. obtusiflorus*, as it must now be named), Syme's varietal names appear to be the earliest; and, if this is so, they must be adopted by those who regard Godron's two plants as being of varietal rank and who follow the international rules of botanical nomenclature. Godron's two plants are undoubtedly very closely related; and few, if any, students of Batrachian Ranunculi will desire either that they should be kept up as distinct species, or placed apart from each other as subdivisions of different species. Fries's plant (*B. marinum*) too is extremely close to those of Godron: in fact, it was reduced by Godron to a variety of his *R. baudotii*; and both Hooker fil. and Rouy & Foucaud follow

---

* This is *R. aquatilis* L. Sp. Pl. 556 (1753) excl. vars.; = *R. diversifolius* Gilibert (1782) emend. Rouy & Foucaud (1893), non Schrank (1789).

Godron in this particular matter. Fries's plant indeed seems to be merely a submerged state of *R. baudotii* Godron destitute of floating leaves, as maintained by N. E. Brown (1891).

The name "*tripartitus*" has been applied to at least five different plants (*cf.* Koch *in litt.* cited by Godron, 1839), namely, to the two British forms or varieties of *R. tripartitus* DC., to *R. obtusiflorus*, to a form of *R. aquatilis* L. emend., and to a form of *R. trichophyllus* Chaix emend.*

Of the two British forms or varieties of *R. tripartitus* DC., one has been referred by Messrs. Groves (1907) to *R. lutarius* Bouvet (1872) = *B. lutarium* Revel (1865). I have seen no authentic specimen of Revel's plant, which has actually been placed by French botanists under *R. homiophyllus* Tenore (= *R. lenormandi* Schultz). However, all the British plants in question which I have seen appear to be better placed under *R. tripartitus* DC. than under *R. homiophyllus* Tenore (= *R. lenormandi* Schultz); and this opinion coincides with the view of N. E. Brown (1891). One may perhaps be permitted to doubt if this plant of Revel has really been found in the British Isles; or is it the case that Revel's plant should be placed under *R. tripartitus* DC.? The latter is by no means an untenable view, if one may judge from Revel's description and figure.

One may now allude to *R. petiveri* Koch. Koch first used this name in Sturm Deutschl. Fl. (1840), and again in the second edition of his Synopsis (1843). *R. tripartitus* Nolte (1826) and *R. tripartitus* var. *obtusiflorus* DC. are cited by Koch as synonyms. N. E. Brown (1891) states that there is a specimen of *R. tripartitus* Nolte in Herb. Mus. Brit., and that he agrees with Hiern (1871) in referring Nolte's plant to *R. confusus* Godron; and this agrees with Hiern's allocation (with which I fully concur) of de Candolle's var. *obtusiflorus*. I think too the figure in Sturm (82, 2) may also be referred to the same species, *i. e.*, to *R. obtusiflorus*. However, the *R. petiveri* Cosson and Germain Fl. Env. Paris 10, Atlas, t. 1, fig. 5–6 (1845) is not Koch's plant, being referred (and no doubt correctly) to his *R. hololeucos* by Lloyd in the various editions of his Fl. de l'Ouest.

In Koch's Syn. ed. 2 (1843), *R. petiveri* is subdivided into two varieties, namely, var. *minor* and var. *major*. The var. *minor* is the *R. petiveri* Koch in Sturm (1840), discussed above. The var. *major* is regarded (erroneously, I think) by Hiern (1871) as the same as *R. triphyllos* Wallroth (1840). The latter plant seems rightly placed by Rouy & Foucaud (1893) under their *R. diversifolius* (= *R. aquatilis* L. emend.). It is closely related to *R. heterophyllus* Babington (1855) non Wiggers (1780) nec Hooker fil. (1884), and is a rare plant. It occurs in the Channel Isles, though I have not seen the restricted plant of Wallroth from the British Isles proper.

---

* Chaix (1786) established his *R. trichophyllus* on No. 1162 of Haller's Hist. Stirp. Helv. ii. 69 (1768): from this it is necessary to exclude Haller's var. β which is *R. fœniculatus* Gilibert (1782) = *R. circinatus* Sibthorp (1794). But see also F. N. Williams in Journ. Bot. xlvii. (1908).

R. petiveri var. *major* Koch (1843) is referred by Rouy & Foucaud, on the other hand, to the particular form of the species *R. trichophyllus* which was named *R. radians* by Revel (1853). This appears to be a form of *R. trichophyllus* with floating leaves, and is, in some ways, a link connecting *R. obtusiflorus* and *R. trichophyllus*. Koch, in the synonymy of his *R. petiveri* var. *major*, cites his own *R. aquatilis* var. *tripartitus* (1835); and, judging from the authentic illustration of this in Sturm Deutschl. Fl., Rouy & Foucaud would seem to be quite correct in their determination. The plant I regard as *R. radians* Revel is locally abundant in the ditches of the fens of Cambridgeshire: it seems to be essentially identical with what passes for "*R. godroni* Grenier," but I have seen no authentic description of the latter plant. Grenier promised one in 1850, in Schultz Arch. de Fl.; but I have been unable to find that the promise was ever fulfilled.

The synonymy of *R. obtusiflorus* and its two west-European varieties is as follows:—

R. OBTUSIFLORUS comb. nov.; *R. tripartitus* var. *obtusiflorus* DC. Syst. Nat. i. 234 (1818); *Batrachium obtusiflorum* Gray Nat. Arr. Brit. Pl. ii. (1821); Hiern in Journ. Bot. ix. 69 (1871); *R. tripartitus* Nolte Novit. Fl. Holsat. 51 (1826) non DC.; *R. petiveri* Koch in Sturm Deutschl. Fl. 82, 2 (1840); *Batrachium marinum* Fries Fl. Suec. Mant. iii. 51 (1842); *R. petiveri* var. *minor* Koch Syn. ed. 2, 13 (1843); *R. baudotii* [Godron ampl.] Syme Eng. Bot. i. 24 (1863); N. E. Brown in Eng. Bot. ed. 3, Suppl. 13 (1891); Rouy & Foucaud Fl. France, i. 65 (1893); *Batrachium salsuginosum* Dumortier in Bull. Soc. Roy. Belg. ii. 217 (1863); *R. marinus* Hooker fil. Stud. Fl. ed. 3, 5 (1884).

(*a*) R. OBTUSIFLORUS var. VULGARIS comb. nov.; *R. baudotii* Godron Essai in Mém. Soc. Roy. Nancy, 21, fig. 4 (1839); Babington in Ann. Nat. Hist. ser. 2, xvi. 395 (1855)!; *Batrachium baudotii* Van den Bosche Prodr. Fl. Batav. 7 (1850); *R. baudotii* var. *vulgaris* Syme *op. cit.* 25 (1863); form *baudotii* Hiern * *op. cit.* 69 (1871).

Icones:—Babington in Eng. Bot. Suppl. t. 2966, as *R. baudotii*.

Exsiccata:—Billot, 2802, as *R. baudotii*; Fries, ix. 28, as *B. marinum*; F. Schultz (Herb. Norm.), 404, as *R. baudotii*; Wirtgen, ix. 436, as *R. baudotii*.

(*b*) R. OBTUSIFLORUS var. CONFUSUS comb. nov.; *R. confusus* Godron in Grenier & Godron Fl. France, i. 22 (1848); Babington *op. cit.* 394 (1855)!; *R. baudotii* var. *confusus* Syme Eng. Bot. i. 25 (1863); form *confusus* Hiern *op. cit.* 69 (1871); *R. baudotii* subsp. *confusus* Rouy & Foucaud Fl. France, i. 66 (1893).

Icones:—Fl. Dan. t. 1993, as *R. tripartitus*; Koch in Sturm Deutschl. Fl. h. 82, t. 2. as *R. petiveri*; Syme Eng. Bot. i. t. 23.

---

* Mr. Hiern's "forms," or "ultimate forms," as he terms them on p. 44 (1871), have no definite systematic grade; and consequently it is incorrect to cite Mr. Hiern as the author of these "forms" when they are given definite rank, such as species, subspecies, race, variety, or *forma*.

Exsiccata:—Billot, 3801, as *R. confusus*; Fries, xv. 28, as *B. confusum*; Wirtgen, ix. 437, as *R. petiveri*.

In the above remarks it has, of course, been necessary to refer to plants which are related (either botanically or in nomenclature) to *R. obtusiflorus*; and below will be found the species (as I understand them) of the section *Batrachium* of western Europe, with the full citations of the various plants referred to in the present communication. The citations are placed after the names of the species to which I consider they belong. A dash is placed before those names which, in my opinion, ought to be distinguished as subspecies or varieties. In recognising nine west-European species of the section *Batrachium*, I am following several leading modern authorities. Syme (1863) united *R. aquatilis* and *R. trichophyllus*; but otherwise his species were the same as those given below. Hooker (1884) and Rouy & Foucaud (1893) adopted precisely the species which are here given. Bentham (Handbook Brit. Fl. 59, 1858) reduced them all to one which he named "*R. aquaticus* Linn." [*sic*]; but I know of no modern systematic botanist in Europe who would now accept Bentham's view of species; whilst Babington (Man. ed. 9, by H. & J. Groves, 1904) divided the section into sixteen species.

1. R. HEDERACEUS L. Sp. Pl. 556 (1753)!

2. R. HOMIOPHYLLUS[*] Tenore Fl. Nap. iv. 338 (1830); *R. cœnosus* Gussone Suppl. Fl. Sic. Prodr. fasc. ii. 187 (1834)!; Godron in Grenier & Godron Fl. France, i. 19 (1848)!; *R. lenormandi* Schultz in Bot. Zeit. xx. 726 (1837)!—? *Batrachium lutarium* Revel in Act. Soc. Linn. Bordeaux, xxv. 413, t. 4 (1865); *R. lutarius* Bouvet in Bull. Soc. Angers for 1871, 96 (1872).

3. R. TRIPARTITUS DC. Icon. Pl. Gall. Rar. 15, t. 49 (1808); N. E. Brown *op. cit.* 13 (1891) excl. syn. Knaf; *R. tripartitus* var. *micranthus* DC. Syst. Nat. i. 234 (1818); *Batrachium tripartitum* Gray Nat. Arr. Brit. Pl. i. 721 (1821); form *tripartitus* Hiern *op. cit.* 68 (1871);—form *intermedius* Hiern *op. cit.* 67 (1871) excl. syn. Knaf; *R. lutarius* [? Bouvet, *loc. cit.*] H. & J. Groves in Journ. Bot. xlv. 452 (1907).

4. R. HOLOLEUCUS Lloyd Fl. Loir.-Inf. 3 (1844); *R. petiveri* Cosson & Germain Fl. Env. Paris, 10, Atlas, t. i. fig. 5–6 (1845) non Koch.

5. R. OBTUSIFLORUS Moss. See above.

6. R. AQUATILIS L. Sp. Pl. 556 (1753) excl. vars.; Godron Essai in Mém. Soc. Roy. Nancy, 24 (1838); Koch, Syn. ed. 2, 12 (1843); *R. heterophyllus* Wiggers Fl. Hols. 42 (1780); Hooker fil. *op. cit.* 5 (1884); *R. diversifolius* Gilibert Fl. Lituan. iii. 262 (1782); Rouy & Foucaud Fl. France, i. 63 (1893); non Schrank; *Batrachium heterophyllum* S. F. Gray *op. cit.* 721 (1821);—*R. triphyllos* Wallroth in Linnæa, xiv. 584 (1840); form *tri-*

---

[*] The justification of this citation may form the subject of a future note.

phyllos Hiern *op. cit.* 69 (1871) excl. syn. Koch.;—*Batrachium heterophyllum*[*] Fries Summ. Veg. Scand. 140 (1846) non S. F. Gray; *R. heterophyllus* Babington *op. cit.* 393 (1855)!, non Wiggers nec Hooker fil.

7. R. FLUITANS Lamarck Fl. France, éd. 2, iii. 184 (1778).

8. R. TRICHOPHYLLUS Chaix in Villars Hist. Pl. Dauph i. 335 (1786) emend.; Hooker fil. *op. cit.* 6 (1884);—*R. drouetii* [Schultz ex] Godron in Grenier & Godron Fl. France, i. 24 (1848)!;—*R. aquatilis* var. *tripartitus* Koch Syn. ii. (1835); *R. petiveri* var. *major* Koch Syn. ed. 2 (1843); *Batrachium godronii* Grenier in Schultz Archiv. Fl. 172 (1850) nomen; Grenier Rev. Fl. Mont. Jura, 25 (n. d.) nomen; *R. radians* Revel in Act. Soc. Linn. Bordeaux xix. 120, fig. 1 (1853); form *radians* Hiern *op. cit.* 99 (1871) incl. form *godronii*.

9. R. CIRCINATUS Sibthorp Fl. Oxon. 175 (1794) excl. syn. L.[†]

In conclusion, a few words may be added regarding the terminations of some of the trivial names. In consulting the literature of these water-crowfoots, one has been struck by the great want of uniformity in two matters. One sees indifferently *R. hololeucus* and *R. hololeucos*, *R. triphyllus* and *R. triphyllos*. On the whole, one prefers the Latinised form in all such cases. Again, there is much inconsistency in the use of one "i" or two "i's" as genitive terminations. One sees indifferently *R. baudoti* and *R. baudotii*, *R. godroni* and *R. godronii*, *R. bachi* and *R. bachii*, *R. lenormandi* and *R. lenormandii*. The former would seem to be the more correct form; but the recommendations of the botanical congresses tend to keep the matter in an unsettled state, for they illegitimately ask for two "i's" when a word ends in a consonant, and are inconsistently content with one "i" if the word ends in "-er." It seems, indeed, as if the recommendations with regard to the construction of botanical names need revision by a committee of scholars.

MISCELLANEA BRYOLOGICA.—III.

By H. N. Dixon, M.A., F.L.S.

(Continued from Journ. Bot. 1913, p. 330.)

SEMATOPHYLLUM ACUTIRAMEUM (Mitt.), a "composite" species.

In the course of working out a collection of mosses made by Rev. C. H. Binstead in Ceylon, it became necessary to study the above plant. It was described by Mitten (Musc. Ind. Or. p. 106) as *Stereodon acutirameus*; the localities given being "In Ceylon, *Gardner*! In mont. Khasian., ad Moflong, in pinetis, *Griffith*!"

---

[*] Probably this ought to be cited as a subspecies; but the point is confused by Fries placing his "*Batrachium*" *heterophyllum* under "*Ranunculus*" *aquatilis*.

[†] *Cf.* Williams in Journ. Bot. xlvii. 15 (1908).

On examining the material at Kew, I found a great confusion of specimens. Neither Gardner's plant nor Griffith's is there represented; the specimens of *Sem. acutirameum* determined by Mitten are Thwaites's C. M. 239 and 239*b* (with others of Beddome's from the Nilgiris). It was at once evident that there were at least two species represented here, and it was necessary to ascertain which, if either, was Mitten's species. Mrs. Britton was kind enough to search Mitten's herbarium, and to send me specimens of Gardner's plants (Ceylon, No. 110—the type, and Ceylon, No. 71) as well as of Thwaites's No. 239.

Gardner's two plants are identical, and on examination prove to be the same thing as *S. monoicum* (Bry. Jav.) Jaeg. The authors of the Bry. Javanica, it may be recalled (ii. 208), say of their species, "affinis videtur *Stereodon acutirameus* Mitt." Authentic specimens of *S. monoicum* agree exactly with Gardner's plant, and it may be pointed out that there is absolutely nothing in either the figures or the description of *Hypnum monoicum* at variance with the diagnosis given by Mitten. Why then did the authors of the Bry. Jav. describe the Javan plant as new? The answer is no doubt to be found in the note which accompanies Mitten's description of his *S. acutirameus*, "*S. Braunii* simillimus, sed foliis angustioribus et florescentia diversa." Now, as *S. Braunii* (C. M.) is not by any means closely like *S. acutirameum* (i. e. *S. monoicum*), and has leaves very distinctly narrower than in Mitten's species (it is in fact one of the markedly narrow-leaved species), it was natural that the authors of the Bry. Jav. should consider their plant with its widely oval leaves as distinct, in spite of the applicability to it of Mitten's diagnosis. The problem remains, what led Mitten to describe his type from Ceylon as having leaves narrower than in *S. Braunii* (C. M.)? This is easily solved, since it is quite clear that Mitten entirely misunderstood *S. Braunii*, as is plain on referring to Gardner's No. 784, which Mitten records (M. Ind. Or., *l.c.*) as *Ster. Braunii*, but which is quite a different plant with distinctly wider leaves, and is, I have little doubt, *S. Nietnerianum* (C. M.) Jaeg. (*Hypnum Nietnerianum* C. M. in Linn. 1869–70, p. 64), with the description of which it entirely agrees. The seta is smooth above, not scabrous as in *S. Braunii*, the capsule very small.

We may go a step further, and find the explanation, with great probability, of Mitten's misunderstanding of *S. Braunii*. It must be recollected that Mitten had not, at that time, the Bry. Jav. with its excellent figures to consult, and had to depend for his knowledge of *S. Braunii* on C. Müller's description in the *Synopsis* (ii. 687), and on any available specimen. Now the specimen of "*Hyp. Braunii* Müll., Herb. Dz. & Mb., Java," in Hooker's Herb., is probably the only specimen which would be available to Mitten at that time, and is no doubt that on which his conception of *S. Braunii* would be based. But this unhappily is not *S. Braunii* at all. The leaves are much wider and more shortly pointed than the figures in Bry. Jav., and the seta is smooth, or only indistinctly roughened at apex. It is a small specimen, and I do not venture to name it,* but it is at least very close to S. *Nietnerianum* (C. M.), of which Müller writes: "Habitu *H. sigmatodontii* vel *Braunii* . . . differt . . . ab hoc pedunculo lævi, foliis multo latioribus ovatis (nec anguste lanceolatis ubique convolutis)." It also resembles in appearance *S. Gedeanum* (C. M.). Now there is another specimen at Kew, under *S. Gedeanum*, which from the mounting and labelling was clearly sent out from Leyden at the same time as the specimen labelled *H. Braunii* in question. The labelling of the two is as follows:—

H. Braunii Müll., Herb. Dz. & Mb., Java.
H. Gedeanum Müll., Herb. Dz. & Mb., Java.

The writing on the two is almost in facsimile, and is no doubt in the same hand. Now the specimen labelled "*H. Braunii*" is, as I have said, a very different plant from the true *Braunii*, with more erect, much wider leaves. The other specimen, "*H. Gedeanum*," consists of two tufts, one of which is certainly entirely *S. Braunii*, the other contains some stems also of *S. Braunii*, with another species which may well be *S. Gedeanum*. It appears extremely probable that the labels have been interchanged in the process of putting up these duplicates; in any case, the erroneous naming is with little doubt the cause of Mitten's misunderstanding of *S. Braunii* and the consequent train of errors. Upon them he based his conception of *S. Braunii*, and his record of *Ster. Braunii* (Gardner, 784) from Ceylon, which is really *S. Nietnerianum*; and also described his *Ster. acutirameus* as having leaves narrower than in *S. Braunii*; which later, no doubt, led the authors of the Bry. Jav. to consider their Javan plant as distinct, and to describe it as *H. monoicum.*

What now are Thwaites's 239 and 239*b*, determined by Mitten as *Ster. acutirameus*? The specimen at Kew of 239 consists of two species, in four tufts, which I have marked *a*, *b*, *c*, *d*. Of these *a*, *b*, *c* are identical with Mitten's type (No. 110, Gardner), *i. e.*, *S. monoicum* (Bry. Jav.). The plant marked *d* is different, and agrees with 239*b* (which is the same plant in the Kew and British Museum specimens). This is a tall plant with narrow, longly convolute, spreading leaves, not infrequently secund; it is distinctly *synoicous*; the seta, roughened above, is about 1 cm. long, the capsule very small (1 mm. long, including the peristome). The perichætial bracts are erect, gradually pointed and slightly denticulate. It is clearly, I think, *S. sigmatodontium*, which has not, I believe, been recorded from Ceylon; but its existence there is quite in accordance with its recorded geographical distribution. It agrees in all its general characters, and the synoicous inflorescence is, I think, quite conclusive.

This, however, does not exhaust the whole question of the Ceylonese "*S. acutirameum.*" Among the specimens sent by

---

* The examination of herbarium specimens of *Sematophyllum* is rather difficult, except with a good deal of dissection, since it is always necessary to ascertain the nature of the inflorescence, while the seta and perichætial bracts also need careful examination.

Mrs. Britton from Mitten's herbarium was one, "Ceylon, Dr. Thwaites, 239 in part," which is different from any of the plants so far mentioned. It is dioicous, has leaves very similar to those of *S. monoicum*, but wider, more concave, with more abruptly narrowed and rather longer and finer points, the seta much longer, 2·5 cm., and the perichætial bracts very distinct, the inner having a shortly loriform denticulate acumen, at the base of which the leaf is abruptly widened, with two or three coarse teeth at each side. It agrees, in fact, exactly with the plant described and figured in the Bry. Jav. as *H. Gedeanum* C. M. (ii. 208, t. 307), where the characteristic perichætial bract is shown as described above. Assuming this to represent C. Müller's species (as to which the authors express a certain amount of doubt), this specimen of Thwaites's is certainly referable to *S. Gedeanum*. Obviously, therefore, Mitten had no very clear conception of his *Ster. acutirameus*, and Thwaites's C. M. 239 and 239*b*, issued by Mitten under that name, contain at least three distinct plants.

I have endeavoured to find out what the co-type of *Ster. acutirameus* Mitt. is, "In mont. Khasian., ad Moflong, in pinetis, *Griffith*!" No specimen of this is to be found in either of the national collections, nor do any of Griffith's specimens exist in Mitten's own herbarium. But under *S. Gedeanum* at Kew there is a specimen determined by Mitten as "*Acroporium Gedeanum* C. Müll., Khasia, Moflong, Herb. Griffith, 245," which I take to be in all probability Mitten's co-type of *Ster. acutirameus*, but as to which he probably revised his opinion at a later date, naming it *A. Gedeanum* (otherwise he would without doubt have recorded Griffith's 245 in the Musc. I. Or. under *S. Gedeanus*, but the only record of that species there is "In Ceylon, *Gardner*!"). I am not able to say certainly to what species this belongs; it does not, however, agree with the *H. Gedeanum* of the Bry. Jav., either in leaves or in perichætium; nor with *S. monoicum*, though near it.

I propose, therefore, to drop the name of *S. acutirameum*, as representing a composite species. It may be argued that the type-specimen being the plant described as *H. monoicum* in the Bry. Jav., the name *acutirameum* should be retained for that plant. The description and figures in the Bry. Jav., however, have established the species quite clearly, and as it is a widely distributed one, it would be unfortunate to disturb the nomenclature. Moreover, it is quite clear that Mitten had no definite idea of the species described as *Ster. acutirameus*—I have shown that three or four different species were so named by him at one time or another (and a Burmese plant, Moulmein, leg. Parish, 96, also determined by Mitten as *Ster. acutirameus*, is probably distinct from them all)—while there is almost a certainty that one of the two plants actually cited by him for *Ster. acutirameus* (Griffith's Khasian plant) was a different species from the actual type. Nor have I in the above remarks in any way attempted to exhaust the number of different species that have passed in one herbarium or another as *S. acutirameum*! I believe, therefore, that there will be a consensus of opinion in putting a merciful end to this much tormented name.

DALTONIA NOVÆ-ZELANDIÆ Mitten.

In Journ. Linn. Soc. (Bot.) iv. (1859), p. 95, Mitten described a plant under the above name from "New Zealand, ravines near Wellington, Stephenson." In the *Handbook of the New Zealand Flora* this is reduced, without comment, to a synonym of *D. nervosa* (H. f. & W.), and *D. novæ-zelandiæ* forthwith disappears from bryological literature.

Quite recently Mr. W. Gray, from whom I have received many interesting New Zealand mosses, sent me a packet labelled "168, *Daltonia* mixed with *Sauloma*, Ropuaranga, Wairarapa, N. Z." On examination it proved to be a species unknown to me, and appeared to agree quite well with Mitten's original description of *D. novæ-zelandiæ*. Further, it became clear that this description by no means fitted the plant now known as *Bellia nervosa* (H. f. & W.) Broth. (*Hookeria nervosa* H. f. & W.), a robust plant with stout nerve reaching to apex, and very short seta, which with *D. straminea* Mitt. has been placed in the new genus *Bellia* by Brotherus on account of these features, and especially of certain definite peristome characters. Now Mitten, among other things, has for his *D. novæ-zelandiæ* "nervo sub apice evanido," while he describes it as very closely resembling *D. splachnoides* in habit; neither of which remarks applies at all to *Bellia nervosa*. I therefore attempted to see Stephenson's plant, of which Mitten writes that only a very small quantity had been seen. None, however, is to be found in the National Collections; nor is there any plant in Mitten's own herbarium so labelled; but Mrs. Britton has found with *D. pusilla* H. f. & W. a mounted specimen, "*Daltonia*, New Zealand"—the only New Zealand *Daltonia* to be found in the collection. This is in all probability Stephenson's plant. It agrees exactly with W. Gray's 168, and with Mitten's original description of *D. novæ-zelandiæ*, and is an entirely good species, in no way closely related to *Bellia nervosa* (H. f. & W.). It is most nearly allied, perhaps, to the Tasmanian *D. pusilla* H. f. & W., but that is a smaller plant, with decidedly narrower and more attenuated leaves, and distinctly narrower cells.* The areolation in *D. novæ-zelandiæ* is rather markedly wide and not much incrassate, while the leaves are somewhat abruptly narrowed above to a moderately wide, not very attenuated nor very acute point. It is at present known only from the two localities above mentioned, in the North Island.

BRACHYTHECIUM TRACHYPODIUM (Funck) B. & S. in Britain.

Brachythecium trachypodium is recorded in the *Census Catalogue of British Mosses* (1907) for v.-c. 88, *i. e.*, Mid Perth. The record depends, I believe, entirely upon a specimen in Mitten's herbarium, but I am not aware that it was ever published by Mitten as a British plant. The specimen has been kindly sent to me by Mrs. Britton. There are two sheets. One has been labelled at New York, "Found with *Brachythecium trachypodium* (Brid.)." It is a good fruiting specimen of *trachypodium*, with Mitten's sketches attached, no locality or date, the only data given being "Mr. Black" in Mitten's hand. It is pretty obvious that this is a Continental specimen placed side by side with the British plant for comparison. The other consists of a small packet, labelled in Mitten's hand "*Hypnum trachypodium* c̄. *Encalypta rhabdocarpa*,[*] Ben Lawers, Hb. Hooker." It is accompanied by a drawing of a leaf and basal cells, which might very well represent *B. trachypodium*. The specimen itself is mainly the *Encalypta*, with one or two stems of a *Brachythecium* not unlike some of the less well characterized forms of *B. trachypodium*, and with leaves that certainly show decided though weak striation—one of the principal characters separating *B. trachypodium* from *B. velutinum*. For all this I should consider it to belong to *B. velutinum* rather than to *B. trachypodium*. The latter species is usually distinguished by its more robust, more rigid habit, with rather stout obtuse branches; the Ben Lawers plant is more silky, with rather slender, tapering branches. In habit and leaf form the Ben Lawers specimen is exactly in agreement with certain forms of *B. velutinum*, notably var. *prælongum* B. & S. (*e. g.* Husnot, Musci Gall. No. 741), to which var. I should refer it. I do not think the slight striation of the leaves, unusual as it is in *B. velutinum*, can be held to outweigh the other characters, and I should certainly consider it very unsafe to base a British record of *B. trachypodium* on this plant. The specimens in question are now placed, at Mrs. Britton's request, in the Kew Herbarium.

---

* It is doubtfully distinct, as Fleischer suggests (Musci . . . von Buitenzorg, iii. 960), from *D. angustifolia* Dz. & Mb.; which again is scarcely separable from the probably widespread *D. splachnoides* Hook. & Tayl.

INDEX SPECIES IN A FLORA.

By the Rev. E. Adrian Woodruffe-Peacock, F.L.S.

What is an index species? A plant that points out the incoming of a new combination of circumstances, or the existence of such circumstances when hidden from view.

A party of botanists were working a marsh dyke with its glory of *Lythrum*, *Utricularia*, *Sparganium*, *Juncus*, and *Carices*. Suddenly they came on *Stachys palustris*, intruding, as it were, amongst the true marsh species. The banks of the dyke were still firm peat, of the *Sparganium*, *Juncus*, and *Carices* formation, but the bed of the dyke had reached the Oxford Clay lying below at the spot, and this permitted *S. palustris* to survive and flourish. There was nothing very wonderful in being able to point out the junction spot in a second and this plant as its index species; the wonder should be that such things are ever passed over, but it was looked on as astonishing by other workers because they had never given their minds to true observation.*

---

[*] This has been written over "*streptocarpa*," but the specimen is *E. rhabdocarpa*.

Surely true ecology (useful but hateful word!) is the art of observing the sequences in nature which follow from changed circumstances. Master the natural surroundings of the plants under all conditions, then the slightest change of circumstance even when invisible, as in the case given, will be clearly demonstrated to the mind. Other instances of invisible influences are easily given. The Chalky Boulder Clay lying in Lincolnshire west of its mother rock, the high Chalk of the Wolds, is not a fairly uniform bed of clay like the Oxford and Kimmeridge Clays. It is made up of layers growing more and more chalky till the basement layer is reached. The lowest zone may contain as much as 90 per cent. of carbonate of lime; or, in other words, practically be chalk moved to another situation. In working a Chalky Boulder Clay area of any considerable size, lying near its mother rock, it will be observed that where the bed feathers out to a thin edge † on the rock below, or where the streams which drain it have cut shallow valleys through its upper and more clayey layers into its lower and more chalky depths, the flora at once shows a change of species: in pasture by the appearance of *Plantago media*, in hedges of *Sison Amomum*, and generally by the coming in of *Senecio erucifolius*, and such species in ditches as *Ranunculus auricomus*, var. *depauperata*, or var. *apetala*. I have never found the typical plant under such circumstances.

The Lower Lias Clays and Limestones give a similar set of varying circumstances, but caused in another way, and generally more visible. These beds were laid down in a fairly shallow sea-bottom not far from land, and consist of thick masses of stiff blue clay interstratified with beds of good building limestone, which, being more resisting to denudation than the clay, frequently make low escarpments. The flora at once indicates the change from clay to stone, though the outcropping zones of limestone are sometimes practically invisible and not more than a few yards across. *Campanula glomerata* appears on the narrowest zones, and *C. Trachelium* and *C. latifolia* along with it on the wider; and *R. auricomus* is found also in its most perfect state—the only place where I have found the typical form. These and many others are all good index species in working such a rock in our Lincolnshire area. It must be remembered that index species may be quite local. Wide field-work demonstrates that they may be peculiar to a very limited area indeed as true index species. This will be perfectly proved when the true ecological method has been applied widely. For instance, *Potentilla argentea* is the best index species for the Spilsby Sandstone in Lincolnshire. It is confined in this county solely to that bed; but beyond our area it is a mere sand index species.

---

* I noted at the time, for I was specially collecting insect visitors that day, that *Bombus agrorum*—the only humble-bee that I have ever personally recorded as visiting *Stachys palustris* for honey, though Mr. G. F. Scott-Elliot has recorded three others—only flew as far as this spot on the dyke. It sucked honey, and then circled round and round, and finally returned by the way it had come, along the upland part of the dyke, quite omitting the marsh stretch below. I do not mean to imply by this that *B. agrorum* is not a marshland species. It is common enough here on our peat carrs, often taken on *Lythrum*; in fact, the only species of *Bombus* I have ever taken personally on it, though Mr. Scott-Elliot records two others. I simply wish it to be understood that the bees observed that day did not mix the honey taken from the upland flora at this junction spot with that from the true marsh species. This fact is, I take it, worth record.

† This feather edge is beloved of certain plants, and also varieties of *Helix virgata*, which are not found on the more clayey masses above.

Not only do index species proclaim what exists now under given circumstances, but they can be safely used to demonstrate in limited areas what once existed, though the circumstances have now completely changed. This is one of the great advantages of intensive ecological study of limited areas when the results are applied to solving the problems of county or vice-county floras.

To give an instance of this, take the *Pyrolæ*. They are recognised as woodland or woodland scrub species.* In Lincolnshire some most curious facts come out of a historical consideration of the position in the past of our only species, *P. minor*. The great block of parishes for which it is recorded lies on the eolian sands at the foot of the escarpment of the wolds for a distance of eight miles north and east of Market Rasen. Now on these sands *Pinus sylvestris* grew as a self-sown species from prehistoric times till about 1840, if not later. Beyond this area *Pyrola* is found in a few isolated spots. These places are worth careful study to see whether it is a good and safe index species of ancient, but now departed, pinesques in this county. In 1840 it was recorded, under the mistaken name of *P. rotundifolia*, for Laughton Common.† This common was the centre of a vast pinesque which flourished into historic times, and stretched north to south for fifteen miles over the eolian sand dunes of the Trent valley. I have personally seen tons of pine which have been dug out of the peat in various parts of this old forest. One spot was called Welfholme—a truly suggestive name for part of the forest that once was there. *P. media* has been destroyed in this area since 1840 by allowing rabbits to increase beyond all reason.‡

---

* The Marine Sand Dune variety *arenaria* of *P. rotundifolia* is no exception to the general rule; where I have seen it growing in the valleys of the Lancashire eolian hills, the ground was scrubby with *Salix repens*, &c.

† There can be no question as to this, for the County Herbarium possesses a specimen of *P. minor* from Nottingham named *P. rotundifolia* by the same authority, the Rev. J. K. Miller, a very good botanist for his time (1787–1855).

‡ In the *Journal of the Ecological Society*, i. p. 273, some doubt is cast on the point whether hungry rabbits will eat *Senecio Jacobæa*. I can only say round the spot where *P. minor* formerly grew—for it is known exactly—*S. Jacobæa* was badly eaten by them. The trees of a fagesque of forty years' growth were badly barked, and many plants were locally exterminated along with *Pyrola*. The most astonishing fact I discovered in this rabbit inquiry was the way *Anthriscus vulgaris* met and adapted itself to this rodent's appetite. The plants were but four or five inches long, buried in moss completely out of sight with the exception of their flowers and seeds.

The next area we come to for which *Pyrola* has been recorded is still in N. Lincs. (54), between Lincoln and Boston. The Kirkby moor and Roughton bed of Plateau Gravel and Coningsby bed of Old River Gravel are still its home. There I have proof that the last of the self-sown prehistoric pinesque scrub was not finally uprooted and destroyed till past the middle of last century. The only other recorded spot for this species is in S. Lincs. (53) in a wood on the same Old River Gravel that the ancient pinesques frequented at Coningsby. There is no peat in this locality, as there is in all the others, to preserve for us proof that pinesques formerly existed in this spot; but considering what is known of the other districts, it is surely safe to say that they were once there too. I can prove their presence in the immediate neighbourhood on the same Old River Gravel.

True ecology will not rest there; it will explain much lying in my notes which is as yet hidden from the wisest. There are index species, varieties, and even hybrids; and we do not yet know to what they point. For instance, the Rev. H. J. Riddelsdell borrowed the arranged County Herbarium series of *Apium nodiflorum* and *A. inundatum*, and their forms. The first is widespread and common, growing in all kinds of waters; the second, thinly but widely scattered, and found in neutral or acid waters. A form found with us was returned named *Moorei* Riddelsdell, which the late Canon Fowler once suggested in conversation was nothing but a hybrid between them, on account of its mixed characteristics. The curious thing is that all the specimens returned named *Moorei* (*i.e.*, approximately *inundatum* × *nodiflorum*) were taken in the known *inundatum* conditions—distinctly acid waters; in the Trent valley too, with the exception of a specimen I have heard of, collected by Mr. G. C. Druce at James Deeping parish on the very borders of this county. I have no notes of any insects visiting the flowers of these Apiums, neither has Mr. Scott-Elliot, which seems extraordinary—not even a Thysanopteron.

CASUAL PLANTS IN MIDDLESEX.

By J. E. Cooper.

The following list, which is far from being exhaustive, may serve to show the great variety of casual and alien plants to be found on waste ground and building land round the Metropolis. All the plants mentioned were collected by the writer. The list excludes (1) plants which are apparently native and (2) those which are presumably garden escapes.

The following abbreviations are used:—

C. E. = Crouch End.
E. F. = East Finchley.
F. = Finchley.
H. M. = Hackney Marshes.
M. Hill = Muswell Hill.
Y. = Yiewsley.

For the identification of several plants the writer is indebted to the Director of the Royal Gardens, Kew. He also desires to thank Messrs. E. G. Baker, S. T. Dunn, and A. B. Jackson for assistance in naming others.

Ranunculaceæ.—*Ranunculus arvensis* L. E. F. 1883; H. M. 1912.—*R. sardous* Crantz. Uxbridge, 1910.—*Delphinium Ajacis* L. Y. 1910.

Papaveraceæ.—*Rœmeria hybrida* DC. Near Potter's Bar, 1912.

Cruciferæ.—*Alyssum incanum* L. C. E. 1897; F. 1900, 1909; Y. 1910–11; M. Hill, 1904; Cowley, 1913.—*Sisymbrium pannonicum* Jacq. E. F. 1909; M. Hill, 1902; F. 1910; H. M. 1910–13; Y. 1909–10. —*S. Columnæ* Jacq. H. M. 1909, 1912–13.—*S. Loeselii* L. Hampstead, 1910; Y. 1911–12.—*S. Sophia* L. Y. 1909–13; F. 1910; H. M. 1912.—*Erysimum cheiranthoides* L. E. F. 1882, 1909; Y. 1909–10, 1912–13.—*E. orientale* Mill. E. F. 1907; F. 1909; H. M. 1913.—*E. repandum* L. Y. 1907.—*Camelina sativa* Crantz. C. E. 1887; M. Hill, 1906, 1909; Y. 1908–9, 1912–13.—*Brassica nigra* Boiss. H. M. 1912.—*B. elongata* Ehrh. F. 1911–12.—*B. alba* Boiss. M. Hill, 1912; H. M. 1912–13.—*Diplotaxis muralis* DC. F. 1907–8; Y. 1908–13.—*Lepidium Draba* L. M. Hill, 1906, 1912–13; H. M. 1909; Hanwell, 1910, 1912; Y. 1910, 1912–13.—*L. ruderale* L. Waste ground everywhere.—*L. virginicum* L. M. Hill, 1902.—*Thlaspi arvense* L. C. E. 1887; M. Hill, 1892, 1902; F. 1909; Harefield, 1910; H. M. 1913.—*Neslia paniculata* Desv. C. E. 1899; E. F. 1907; H. M. 1912–13.—*Rapistrum orientale* DC. Y. 1912–13; H. M. 1912–13.—*R. perenne* DC. Y. 1910; F. 1912.—*R. rugosum* Berg. H. M. 1913.—*Euclidium syriacum* Br. H. M. 1912.

Caryophyllaceæ.—*Dianthus Armeria* L. E. F. 1883.—*Saponaria Vaccaria* L. C. E. 1885; E. F. 1907; H. M. 1912–13; Y. 1913.—*Gypsophila elegans* Bieb. H. M. 1913.—*Silene conoidea* L. H. M. 1912.—*S. anglica* L. Y. 1908; F. 1909–10; H. M. 1913.—*S. nutans* L. H. M. 1912.—*S. noctiflora* L. C. E. 1897; M. Hill, 1902; H. M. 1910; Y. 1909, 1913.—*Lychnis Githago* Scop. F. 1908–9; Y. 1909, 1913.

Malvaceæ.—*Hibiscus Trionum* L. Fortis Green, 1909.—*Malva pusilla* Sm. Y. 1909–10.—*M. parviflora* L. Fortis Green, 1911; Y. 1912; H. M. 1912.

Geraniaceæ.—*Geranium pusillum* Burm. E. F. 1908.—*Oxalis corniculata* L. Muswell Hill Road, 1897.—*Impatiens parviflora* DC. Hampstead, 1891, 1908; C. E. 1897; Uxbridge, 1910.

Leguminosæ.—*Trigonella Fœnum-græcum* L. Y. 1908, 1913.—*T. cærulea* Ser. H. M. 1912–13.—*Medicago falcata* L. M. Hill, 1904; H. M. 1912.—*M. denticulata* Willd. Y. 1908–9; H. M. 1912–13.—Var. *apiculata* Willd. Y. 1909; H. M. 1910, 1912.—*M. lappacea* Desv. Y. 1908; H. M. 1912.—*Melilotus alba* Desv. Waste ground, many localities.—*M. officinalis* Lam. F. 1906; Y. 1908, 1910; E. F. 1909; H. M. 1909.—*M. indica* All. C. E. 1898; M. Hill, 1902; F. 1908, 1910; Y. 1909–10, 1913; H. M. 1909–10.—*Trifolium lappaceum* L.

E. F. 1907; Y. 1908; F. 1910.—*T. ochroleucon* Huds. F. 1907; M. Hill, 1907.—*T. arvense* L. F. 1908; E. F. 1909.—*T. parviflorum* Ehrh. H. M. 1913.—*T. resupinatum* L. M. Hill, 1902.—*Anthyllis Vulneraria* L. Roadside near Staines Moor, 1910–13.—*Scorpiurus subvillosus* L. Fortis Green, 1911.—*Vicia lutea* L. Y. 1912; H. M. 1912.—*V. villosa* Roth. Y. 1908, 1913. E. F. 1908.—*V. pseudocracca* Bert. C. E. 1897; F. 1909; Y. 1911–13; H. M. 1912–13.—*V. peregrina* L. H. M. 1912.—*Lathyrus Aphaca* L. E. F. 1909; H. M. 1909, 1912; Y. 1912.—*L. hirsutus* L. C. E. 1897; E. F. 1909; H. M. 1912–13.—*L. Cicera* L. H. M. 1912.

ROSACEÆ.—*Potentilla hirta* L. C. E. 1897; M. Hill, 1902; Y. 1908–9; F. 1910.—*P. argentea* L. Highgate, 1887–8; Y. 1901.

UMBELLIFERÆ.—*Conium maculatum* L. Y. 1912.—*Bupleurum rotundifolium* L. Whetstone, 1906. Y. 1908.—*B. protractum* L. & H. H. M. 1913.—*Carum Carvi* L. Highgate, 1887; E. F. 1909; Y. 1910–11, 1913.—*Fœniculum vulgare* Mill. H. M. 1912–13.—*Coriandrum sativum* L. H. M. 1913.—*Caucalis daucoides* L. H. Mill, 1906; H. M. 1912.—*C. arvensis* Huds. Harefield, 1913; near Colnbrook, 1913.

RUBIACEÆ.—*Galium tricorne* Stokes. Highgate, 1887; F. 1908; Y. 1910, 1913; H. M. 1912–13.—*Asperula arvensis* L. E. F. 1908.

VALERIANACEÆ.—*Valerianella dentata* Poll. Harefield, 1912.

DIPSACEÆ.—*Dipsacus fullonum* L. Y. 1908, 1910–11, 1913.

COMPOSITÆ.—*Erigeron canadense* L. Highgate, 1897; M. Hill, 1905; F. 1906, 1908; Y. 1909; H. M. 1909–10.—*E. acre* L. Y. 1910; Harlington, 1910.—*Ambrosia trifida* L. Highgate, 1897; H. M. 1912.—*A. artemisifolia* L. F. 1900; M. Hill, 1902.—*Xanthium spinosum* L. H. M. 1913.—*Achillea tanacetifolia* All. Y. 1910.—*Guizotia abyssinica* Cass. Y. 1913.—*Anthemis tinctoria* L. Y. 1910; F. 1910.—*A. Cotula* L. F. 1910; Y. 1912; H. M. 1912.—*A. arvensis* L. F. 1907, 1910; Y. 1910, 1912; H. M. 1912.—*Matricaria suaveolens* Buch. Highgate, 1907, 1910; F. 1908; H. M. 1912–13.—*Cotula coronopifolia* L. M. H. 1913.—*Artemisia biennis* Willd. H. M. 1913.—*A. longifolia* Mitt. Y. 1913.—*Senecio viscosus* L. Highgate, 1897; M. Hill, 1900; Y. 1909, 1913; F. 1910; H. M. 1909–10.—*Carduus pycnocephalus* L. (*tenuiflorus* Curt.). Y. 1913.—*Cnicus eriophorus* Scop. C. E. 1896.—*Silybum Marianum* Gaertn. E. F. 1907–8, 1910; Y. 1908–9, 1913.—*Centaurea calcitrapa* L. Fortis Green, 1911.—*C. solstitialis* L. Y. 1912; Harefield, 1912.—*C. melitensis* L. Y. 1912; H. M. 1912–13.—*Carthamus tinctorius* L. E. F. 1906; Y. 1908–9.—*Picris echioides* L. E. F. 1883; F. 1910; Harefield, 1912.—*Lactuca virosa* L. Y. 1908–13; M. Hill, 1910; Harefield, 1913.—*L. Serriola* L. Y. 1913.

PRIMULACEÆ.—*Anagallis fœmina* Mill. Highgate, 1911.

BORAGINACEÆ.—*Lappula echinata* Gilib. Y. 1910; H. M. 1913.—*Borago officinalis* L. E. F. 1908; Y. 1913.—*Anchusa* *officinalis* L. E. F. 1908.—*Lithospermum officinale* L. Y. 1910–12; H. M. 1913.—*Echium vulgare* L. M. Hill, 1903; Whetstone, 1906; F. 1909; E. F. 1909.

Solanaceæ.—*Atropa Belladonna* L. C. E. 1896; Harefield, 1908. — *Datura Stramonium* L. var. *tatula* L. Y. 1913. — *Hyoscyamus niger* L. Neasden, 1908; Y. 1910; F. 1909–10; H. M. 1910, 1912–13.

Scrophulariaceæ.—*Antirrhinum Orontium* L. Stanwell Moor, 1913. — *Alonsoa peduncularis* Wetts. F. 1909.

Labiatæ.—*Salvia verticillata* L. M. Hill, 1905; F. 1907–8; Y. 1909.—*Marrubium vulgare* L. M. Hill, 1905; Y. 1911; H. M. 1912.—*Stachys arvensis* L. Stanwell Moor, 1913. — *S. annua* L. C. E. 1897; F. 1910; Y. 1912. — *Galeopsis angustifolia* Ehrh. M. Hill, 1900; F. 1910; Y. 1910, 1912.—*G. Tetrahit* L. Highgate, 1883; E. F. 1908, 1910; H. M. 1909; F. 1910. — *Leonurus Cardiaca* L. Hendon, 1907.

Plantaginaceæ. — *Plantago arenaria* W. & K. C. E. 1896; H. M. 1912.

Amarantáceæ.—*Amaranthus retroflexus* L. E. F. 1897; F. 1908, 1910–11; Y. 1908–11, 1913; H. M. 1912–13.—*A. Blitum* L. H. M. 1913.

Chenopodiaceæ.—*Chenopodium murale* L. M. Hill, 1896; E. F. 1906.—*C. rubrum* L. E. F., F., Y., H. M. (very abundant). — *C. polyspermum* L. E. F., F., Y., M. Hill (abundant). — *C. glaucum* L. M. Hill, 1906; Y. 1909.—*C. Bonus-Henricus* L. F. 1912–13.—*C. ambrosioides* L. Y. 1911.—*Suæda maritima* Dum. H. M. 1909.

Polygonaceæ.—*Rumex limosus* Thuill. Hornsey, 1887–8; C. E. 1897; F. 1911; H. M. 1913.

Euphorbiaceæ.—*Mercurialis annua* L. E. F. 1909; H. M. 1909–10, 1912; Y. 1913.

Urticaceæ.—*Cannabis sativa* L. C. E. 1897; Y. 1908–9.

Graminaceæ.—*Panicum Crus-galli* L. Highgate, 1896; C. E. 1897; M. Hill, 1902; F. 1908; Y. 1908–10; H. M. 1912–13.—*P. miliaceum* L. C. E., F., E. F., Y. (abundant).—*P. capillare* L. C. E. 1897; Highgate, 1899.—*Setaria viridis* Beauv. C. E. 1897; M. Hill, E. F., Y., F. (often abundant). — *S. glauca* Beauv. (occurs with the last in all localities).—*Phalaris canariensis* L. (abundant at times in all localities). — *P. minor* Retz. H. M. 1912.—*P. paradoxa* L. E. F. 1907; F. 1908; Y. 1908, 1912; H. M. 1912.—*P. angusta* Nees. H. M. 1913.—*Anthoxanthum aristatum* Boiss. H. M. 1909, 1913; Y. 1913. — *Agrostis scabra* Willd. F. 1910; H. M. 1912; Y. 1913.—*Apera Spica-venti* Beauv. M. Hill, 1906; E. F. 1909; H. M. 1909; Y. 1910–13. — *Aira caryophyllea* L. H. M. 1913. — *Trisetum paniceum* Pers. H. M. 1913. — *Avena fatua* L. E. F. 1908–9; F. 1908–10; H. M. 1909. — *Cynosurus echinatus* L. E. F. 1910, F. 1910–11; Harefield, 1910; H. M. 1913.—*Glyceria distans* Wahlb. H. M. 1909–10, 1912; E. F. 1910. — *Festuca myurus* L. Y. 1912–13; H. M. 1913. — *Bromus* *rigidus* Roth. M. Hill, 1907; Y. 1911–13; H. M. 1913.—*B. tectorum* L. Potter's Bar, 1912; H. M. 1913.—*B. secalinus* L. F. 1913.—*B. arvensis* L. E. F., M. Hill, Y. (sometimes abundant).—*B. brizæformis* W. H. M. 1912; Y. 1913.—*B. unioloides* H. B. & K. E. F. 1906-8; F. 1908-10; Y. 1909, 1913; H. M. 1913.—*Ægilops cylindrica* L. Fortis Green, 1909.—*Æ. triuncialis* L. H. M. 1912.—*Hordeum jubatum* L. H. M. 1909–10.

REVIEWS.

British Plants.

The Cambridge British Flora. By C. E. Moss, D.Sc., F.L.S., assisted by Specialists in certain Genera: illustrated from Drawings by E. W. Hunnybun. Volume II. *Salicaceæ* to *Chenopodiaceæ.* Folio; paper boards, pp. xx, 206; 206 plates. Price £2 5*s*. net. Cambridge: University Press.

British Flowering Plants. Illustrated by Three Hundred full-page coloured plates [by Mrs. Henry Perrin], with detailed descriptive Notes and an Introduction by Professor Boulger, F.L.S. 4to, buckram gilt, pp. xlv; lxvi plates with text. London: Quaritch.

It is somewhat remarkable that there should appear within a few days of each other two works devoted to the British Flora which, from their different standpoints, may be regarded among the most important of their class. We must go back to the beginning of Syme's edition of *English Botany* half a century ago for anything equalling in importance *The Cambridge British Flora*, while we shall find nothing to compare in sumptuousness of get-up with the new work on *British Flowering Plants.*

The appearance of Dr. Moss's work—we note that, originally appearing as editor, his name now stands as author—has been anticipated by British botanists with the greatest interest: not only to them does it appeal, for its completeness and attention to detail entitle it to take rank among works of Continental importance. The Cambridge University Press has been fortunate in securing the services of Dr. Moss, than whom no one more competent for the task could be found. By a combination as admirable as it is rare, Dr. Moss is at once an acute field botanist, a diligent investigator of herbaria, and a student of botanical literature: in a comparatively short time he has attained a leading position among British botanists and has acquired a knowledge of the history of his subject equalled by few. Mr. Hunnybun's drawings are all made from living plants, so that the work may be regarded as representing more fully than has been hitherto done our knowledge of British botany at the present day.

The many features new to British botany which the book contains begin with the arrangement, which is that of Engler's *Syllabus*—not hitherto adopted in any British flora. It has been found convenient to begin with the second volume, which contains orders of unattractive appearance though of great botanical interest: a list of these was given so recently in these pages

(p. 87) that it is unnecessary to repeat it here. The treatment of the species is so detailed that only one critically versed in their study could offer any useful comment upon it. We must therefore content ourselves with some remarks upon the general plan and execution of the work, as detailed by Dr. Moss in his introduction.

The objects of the work are thus stated: "First, an attempt is made to register the present state of knowledge with regard to British plants—their classification, their names, their characters, and their distribution. Secondly, an attempt is made to relate British plants to the allied forms of foreign countries. And thirdly, a hope is entertained that the work will result in stimulating further research concerning British plants, particularly with regard to the study of their variations and the distribution of the less well-known forms."

The section on nomenclature is interesting and clearly set forth, but we regret that the Rules and recommendations laid down by the International Congress at Vienna have not been altogether, instead of "in general," adopted. We are entirely at one with Dr. Moss in rejecting the accidental binominals of Hill and other pre-Linnean books, though we are not so clear as to the exclusion of Adanson as "pre-Linnean in character although not in chronology"; but we think the names of species ought, in all possible cases, to stand as in the first edition of Linnæus's *Species Plantarum*. What is referred to as "the Kew rule" was not happily so named; for although the retention of the earliest trivial name received by a species when placed under its correct genus—always observed by the British Museum and usually by French botanists—was often followed at Kew, it was there subordinated to "convenience" when such subordination was considered desirable.

Our chief objection however is to the use of small letters for trivial names, as to which Dr. Moss expressed his views in this Journal for 1913, p. 21: as we then said, "it seems to us undesirable to depart from a practice which is sanctioned both by rule and custom," and we cannot agree with him when he says that no "precise rule or custom" exists. The matter is hardly of sufficient importance to make a fuss about, and we allow Dr. Moss—who, like the rest of us, likes to have his own way and is perhaps more fortunate because more insistent in getting it—to follow his plan in our pages rather than deprive our readers of his valuable contributions. But it seems undesirable to depart from established custom unless for some considerable advantage; and it is not without significance that the Kew botanists, who at one time adopted the practice, soon returned to the general custom. A similar departure from general use is noticeable in the printing of the name of the species at the head of each description without any appended authority: Dr. Moss gives no reason for this method, which was opposed by all the botanists who spoke at the meeting held to consider the plan of the Flora.

The synonymy given for each species includes certain names taken from pre-Linnean British authors, chiefly from Gerard and Ray—a beautiful photogravure portrait of the latter forming the frontispiece to the volume—followed by a number of references to the more important works in which the plant has been described, under the name adopted or under others: to each reference the date is appended. No attempt is made to include folk-names, although one English synonym is given for each species when such name is generally known. A good deal of attention has been given to distribution, which in many cases is illustrated by useful maps.

In the matter of classification, the subdivision of orders is carried out very thoroughly; many of the subdivisions are new: thus of the three subclasses of Engler's Archichlamydeæ, two are here first established, and Populus is grouped under four series, all of them new. Although the numerous subdivisions of species which make some Continental books practically unworkable is comparatively restrained, there are amply sufficient here to tax the observation of the collector; thus of *Atriplex patula* four varieties and three forms of one of these are described: the reference appended to the authority for some of the names has a somewhat strange appearance—one does not at first sight recognize that "var. *erecta* forma *crassa* Moss and Wilmott in Camb. Brit. Fl. ii. 174" actually refers to the page in the present volume on which the name appears.

The book is handsomely printed, but might have been better arrayed. It would perhaps be too much to expect that a new page would be begun for each species, but certainly each family should start on a fresh one. It is not easy to understand why the genera should be printed in small black type while the species are in large capitals. The different types are however on the whole judiciously employed; and the use of a large quantity of small but clear type allows the inclusion of a vast amount of information.

A few names will come to most botanists as new: *Populus tacamahacca* Miller (1768) supersedes *P. candicans* Aiton (1789); *Oxyria* appears as *Rheum digynum* Wahlenberg. *Mesembryanthemum edule* occurs for the first time in a British flora, being "naturalized near the sea on cliffs, rocks, old walls, and hedgebanks in the Channel Islands, Cornwall (including the Scilly Isles) and in the Isle of Wight"; *Quercus Ilex* and *Q. Cerris* are also regarded as naturalized in southern England; *Salsola Tragus*, "not indigenous," is included as having been found in various localities. The genus *Salsola*, by the way, is contributed by Mr. C. E. Salmon; the Rev. E. Marshall has undertaken *Betula*, a genus at which he has long worked; the rest of the book is by Dr. Moss, with the assistance of Mr. Wilmott in *Atriplex* and of Dr. E. J. Salisbury in *Salicornia*.

Turning to Mr. Hunnybun's plates, it is to be noted that "each plant or portion selected has been drawn natural size," and is "reproduced without reduction or enlargement": "each drawing has been made from a fresh plant, the name of which has been vouched for by some competent authority whose letter of identification"—and we assume also the specimen—"is preserved in the

Cambridge University Herbarium." In a few cases, cultivated examples have been used, but by the co-operation of numerous botanists Mr. Hunnybun has been supplied with specimens of most of the species which were not gathered by himself. The orginal pen-and-ink drawings were presented by Mr. Hunnybun to the University; many were previously circulated among botanists, who expressed a high opinion of their artistic merit and scientific value. The number of forms presented is remarkable and, at any rate so far as British botany is concerned, unique; thus *Populus* and *Atriplex* are represented by 17 plates, *Ulmus* by 16, *Salicornia* by 12. They are reproduced by a special process and are mostly in outline; the few dissections added in most cases, are not, we understand, considered by experts as altogether satisfactory. For the botanical accuracy of the plates the name of Dr. Moss is sufficient guarantee, and Mr. Hunnybun is to be congratulated on the success with which he has, in most cases, succeeded in conveying the habit—the *port*, as the French more expressively put it—of the plants: this is especially notable in the *Polygonaceæ* and *Chenopodiaceæ*. The plates of *Salicornia* form an important contribution to the knowledge of the genus and will we think be welcomed by Continental as well as by British botanists. The branches of trees please us less; from the artistic standpoint they leave a good deal to be desired. In many cases the specimens seem to have been thrown down anyhow and to have been drawn as they fell—we do not suppose that such was the case, but it is certainly the impression conveyed. This is the more to be regretted because the size of the page enables the specimens to be fully displayed, and there thus seems no reason why they should be placed across one another as they are in numerous instances—*e.g.* nos. 2, 19, 20, 28; the object may have been to avoid a formal and diagrammatic appearance, but we think anyone who will contrast these with nos. 18, 22, 23, 26, will prefer the more formal arrangement. In many of the Atriplexes and Chenopods the separate leaves are scattered about in a casual way as if they had fallen from a height on to the paper, usually pointing downwards. In many cases, too, where a fragment of a plant only is given, the whole might well have been displayed. A study of the figures in some of the sixteenth-century herbals, notably those of Brunfels (1530) and Leonard Fuchs (1542–3) would, we think, have resulted in the production of figures not less accurate but far more artistic as well as more informing; a comparison of Mr. Hunnybun's plate of Knotgrass with Fuchs's figure will illustrate our meaning.

A like criticism applies to many of the plates which form the *raison d'être* of Mrs. Perrin's handsome volume—the first of four—on *British Flowering Plants*, on the title-page of which, by an excess of modesty, her name does not appear. Many of these are extremely good, although, well reproduced as they are, they are not as good as the original drawings, in the exhibition of which we noticed some—notably that of the Sloe, to appear in a later volume—of really supreme excellence. Turning over the pages, we should place among the figures of first rank those of the Scotch Fir, the Water Plantain, the Arum, the Fritillary, the Twayblade and the Ragged Robin: all these are excellent. But the very accuracy of Mrs. Perrin's reproduction of individual specimens has in many cases resulted in an inadequate representation of the plant presented. Even Mr. Hunnybun's plates occasionally suffer from this individuality, but we are inclined to think that in his case a wide general knowledge has enabled him to interpret the individual in the light of the species, whereas Mrs. Perrin seems to have restricted herself absolutely to what was actually before her; nor has she always selected characteristic specimens. As examples of this may be mentioned the otherwise excellent figures of the Bur-reed, the flowers of which are too young to show the "golden tufts of ripe stamens," the Arrowhead, and the *Epipactis* called *latifolia*: this last, so far as it goes, could hardly be better, but almost all the flowers are unexpanded. The Bog Asphodel is somewhat past its prime; the example of *Orchis mascula* does the species scant justice; the figure of the Corn Cockle hardly adequately represents a very beautiful plant, either in the colour of both flower and leaves (many of the greens throughout are susceptible of improvement) or in the size of the former. The representations, seeing how much space was at the artist's disposal, are sometimes disappointingly inadequate; the Sheep's Sorrel, for example, might well have shown the underground growth which makes the plant so terrible a nuisance in gardens where it has attained a hold: the figure in Curtis's *Flora Londinensis* may be contrasted with this. The only really unsatisfactory plate in the book is that of the Stitchworts; this according to the list contains three, but according to the text four species; we are inclined to think the former correct, as we can find nothing in the least resembling *S. palustris*, either in flowers or foliage.

Mr. Boulger's introduction and "descriptive notes" are of course accurate. The arrangement followed is that of Engler; admitting that this is "the best linear grouping as yet achieved," we have doubts as to the wisdom of adopting it in a popular volume; many folk who have no claim to be considered botanists have a sort of general notion that things begin with *Ranunculaceæ*. To the scientific botanist the book hardly appeals—it contains only 290 species and entirely omits grasses and sedges, as well as "the less attractive water-plants"; hence we rather regret the care and cost which must have attended the production of the coloured analytical plates. A little more botany might we think have been added; thus, when describing a species something might have been said about its allies—*e. g.* under *Sparganium erectum* some indication might have been given of the characters of *S. simplex*. The letterpress is an excellent example of a successful combination of science and popular lore, thus differing in this respect from most popular books. The English names which head the description are occasionally unfamiliar—*e. g.* "Good Friday Grass," a purely local name for *Luzula campestris*—

and even inappropriate—anything less suggestive of "Spring Beauty" than *Claytonia perfoliata* it would be difficult to conceive, however appropriate the name may be to the species in the same genus with which it is usually associated.

It remains to be said that the book is beautifully printed and handsomely bound in buckram; the colour-printing is on the whole excellent.

BOOK-NOTES, NEWS, &c.

At the meeting of the Linnean Society on April 2, Mr. Clement Reid showed a lantern-slide of photographs from seeds of a new species of *Corema* (*C. intermedia*) from the Pliocene Cromer Forest Bed. The same had also been found in a similar deposit in the Netherlands, at Tegelen. The plant forms the subject of a paper by Mr. Reid in our present issue. Mr. R. Allen Rolfe exhibited a series of coloured drawings of five hybrid Ophryses, raised by M. Fernand Denis, Balaruc-les-Bains, France, from *Ophrys tenthredinifera* Willd. crossed with the pollen of *O. aranifera* Huds.; together with the two parents. This was believed to be the first hybrid *Ophrys* raised artificially, and it proved the origin of a natural hybrid that has been recorded from three localities in Italy, and is known under the names of *O. Grampinii* Cortesi and *O. etrusca* Asch. & Gräbn. The hybrids varied somewhat between themselves, but all showed an unmistakable combination of the characters of the two parents, particularly in the colour and markings of the lip, and in the peculiar combination of rose and green in the sepals and petals. M. Denis has a batch of some forty seedlings in flower or bud. At least eighteen natural hybrid Ophryses have been recorded, and Mr. Rolfe believed there were others.

"After several years of preparation and discussion the Federal Government has just decided to create a large reserve, on the lines of the American Yellowstone Park, in the Lower Engadine for the protection and preservation of Swiss fauna and flora, especially the former. A subsidy of £1200 a year has been granted to the communes interested for a period of ninety-nine years, but the contract must be renewed every twenty-five years for the upkeep of the park, supervision, &c. The 'park' is ready-made by Nature, for it is situated in one of the most lonely and most untouched corners of Switzerland, containing mountains, forests, streams, and pastures which have been rarely visited except by smugglers who 'trade' with Italy in contraband goods. The little village of Zernetz will be the headquarters of the park, through which there are only a few bridle paths, although it is not very far from the fashionable resort of St. Moritz. The reserve will be stocked by the authorities and at the expense of private societies. Owing to the lack of legislation the fauna of the Alps during the last fifty years has been almost exterminated, and the new measure will be only just in time to save several species."—*Standard*, April 2.

NOTES UPON TEESDALE PLANTS.

By C. E. Salmon, F.L.S.

The following notes have been put together mainly for the purpose of comparing the condition of the more uncommon Teesdale plants in 1892, an ordinary English season ("three fine days and a thunderstorm"), and in the phenomenally hot and dry summer of 1911.

The first visit was from June 11th–20th, when my brother and I had the advantage of the company of Messrs. J. B. and A. J. Crosfield, without whose guidance many of the "Teesdalians" would have been missed; the second trip was from July 4th–20th, in the company of Dr. A. H. Fardon.

It will be seen that, although the conditions may be pleasant for botanizing, a hot dry season by no means produces such a good display of mountain or rock plants as a normal summer. The Globe-flower had suffered extremely; a meadow near High Force, yellow with the blossoms in 1892, did not show a single flower or fruiting-spike in 1911.

D. = Durham, v.-c. 66; W. = Westmoreland, v.-c. 69. All the v.-c. 64 records were noted in 1911. Supposed new records have an asterisk.

The Rev. E. S. Marshall, Rev. E. F. Linton, Messrs. H. and J. Groves (*Characeæ*), and Mr. A. Bennett have kindly helped me in naming critical forms.

Thalictrum minus L. Limestone W. of Selside, v.-c. 64.

Meconopsis cambrica Vig. Pot hole, near Selside, v.-c. 64.

Draba incana L. Forest-in-Teesdale and limestone ridge near Ettersgill Beck, D., 1911.

Cochlearia alpina Wats. By Harwood Beck, D., 1911. Limestone hills above Brough, W., 1911.

Helianthemum canum Baumg. var. *vineale* (Pers.). Flowering in profusion in its well-known locality in 1892; in 1911 not putting up nearly so many blossoming shoots. The Teesdale plant seems to have leaves much more glabrous above than those of the Great Orme's Head form, indeed some of them are quite hairless. Mr. Williams (Prod. Fl. Brit. pars x, 1912, 573) fails to distinguish *vineale* on "comparing examples from Clare with examples from the Welsh coast," but, as far as the Teesdale plant is concerned (I do not know the Irish), it seems worth separating at least as a "forma."

Polygala amara L. In fair quantity in 1892 and 1911; the blue-flowered plant seen in 1911 does not grow intermixed, apparently, with the more frequent (as regards Teesdale) pink form. J. D. Hooker had evidently not seen the blue form in Teesdale; he says (Stud. Fl. 1884, 51): "The Teesdale form (*P. uliginosa* Fries) is rather more fleshy and has rosy flowers; the Kent form (*P. austriaca* Crantz) is blue-flowered. I find no difference between their capsules. It is certainly the *P. amara* of Linn. Herb."

P. oxyptera Reichb. Holwick Scars, 1911, v.-c. 65.

Arenaria uliginosa Schleich. In good quantity in its well-know locality in both 1892 and 1911.

A. gothica Fr. Seen in three stations in the Ingleborough district, v.-c. 64.

Sagina nodosa Fenzl. E. side of Ingleborough, v.-c. 64.

**Montia lamprosperma* Cham. Holwick Fell, 1911, v.-c. 65.

Geranium pratense L. Near Malham village, v.-c. 64, a beautiful form occurred with pale lilac flowers.

G. lucidum L. Near Great Musgrave and laneside near Hillbeck, Brough, W., 1911.

Vicia sylvatica L. Swindale Beck, Brough, W., 1892.

Dryas octopetala L. Plentifully in flower in 1892 in its only Teesdale station; not a single blossom showing in 1911, although leaves were in abundance.

Geum rivale × *urbanum* (*intermedium* Ehrh.). Barnard Castle, with the parents, D., 1892.

Alchemilla alpestris Schmidt. Forest-in-Teesdale and High Force, D., 1911. *Near Cronkley Fell, v.-c. 65, 1911.

**A. minor* Huds. Forest-in-Teesdale, D., 1911. Mickle Fell, v.-c. 65, 1911.

Saxifraga nivalis L. In its Westmoreland station in fair quantity in 1892; we failed to hit the right spot in 1911, but my friend Mr. A. Wallis tells me he saw it in 1913 (see J. G. and E. G. Baker in Journ. Bot. 1894, pp. 302, 345).

Galium sylvestre Poll. Forest-in-Teesdale and limestone ridge near Ettersgill Beck, D., 1911. Limestone hills above Brough, W., 1911.

**Valeriana Mikanii* Syme. Near High Force, D., 1911.

Matricaria suaveolens Buchen. Too common near Clapham, v.-c. 64.

Senecio spathulæfolius DC. Seen in its station near Brough, Westmoreland, in 1892, in plenty, but with no signs of its attempting to flower or having flowered! In 1911 the conditions were *exactly* the same, and I was interested to hear from Mr. J. Backhouse that he has never seen it in flower in this—its only inland locality in Britain—where his father discovered it. Some rosettes were brought back to Reigate in 1911 and planted in chalky soil; these flowered sparingly in 1912, but luxuriantly and well in 1913, some of the stems bearing twenty-four heads!

Mr. J. G. Baker has an interesting note upon the plant in this Journal for 1885, p. 8, where he remarks that the dividing line between *S. spathulæfolius* DC. and *S. campestris* DC. is very hard to define; in this opinion I concur. He goes on to say: "According to Grenier & Godron, there is no *campestris* at all in France, but all the French plant is *spathulæfolius*. But cross the Channel and immediately on the chalk downs of Sussex and the Isle of Wight *campestris* begins, and there is no *spathulæfolius* till the whole breadth of England and Wales is crossed. Speaking from a geographical point of view, one would not care to believe in such an anomaly as this, unless there were very decided evidence in its favour."

As regards the first point, I think *S. spathulæfolius* (at least as far as the Holyhead and Westmoreland plants are concerned) may be best distinguished by being a larger plant in all respects (though I admit size alone is a poor character), having a more arachnoid appearance (*campestris* is sometimes nearly glabrous), shorter pappus, and especially by its larger number of heads and the shape of its leaves. These have on the stem peculiar broad-based petioles, whilst the root-leaves are often long-petioled (longer than the blade), with their base much more truncate than in *campestris*. As to the second point, it may be noted that recent French botanists (Coste, Rouy, &c.) admit the two plants as inhabitants of their country, although apparently *campestris* is decidedly the scarcer.

The two plants would bear further investigation, and it is worth noting that Hooker (Stud. Fl. 1884, p. 220) considers our larger plant to be *S. campestris* DC. var. *maritima* Syme (*S. spathulæfolius* Bab. non DC.). Syme (Eng. Bot. ed. 3, v. p. 90, 1866) divided *S. campestris* as follows:—"*α. genuina.* Radical leaves entire or slightly toothed. Stem 3 inches to 1 foot high. *β. maritima.* Radical leaves generally with numerous broad teeth. Stem 1 foot high. Anthodes more numerous and larger than in var. *α*." But he goes on to say, "Of var. *β* I have seen no specimens."

Rosettes gathered in 1911, which flowered in 1913, promise to flower again this season, although some have died; Mr. Williams (Prod. Fl. Brit. i. 1901, 40) says "biennis"; most Continental floras give it a perennial habit. It may really be a biennial, whilst individuals in exceptional circumstances remain on and flourish for two or three more seasons.

Owing to an error as regards county in Babington's account of this plant in Journ. Bot. 1882, p. 35, Yorkshire has been credited with possessing the locality instead of Westmoreland, and this has not, I believe, been corrected until the present note.

Hieracium anglicum Fr. and var. *brigantum* F. J. H. Limestone hills above Brough, W., 1911. The latter plant was observed in 1892, and reported under another name in Journ. Bot. 1893, p. 219, which thus needs correcting.

**H. lasiophyllum* Koch. Falcon Clints, D., 1892. Determined by A. Ley.

H. stenolepis Lindeb. var. *sub-britannicum* Ley. Limestone scars E. of Ingleborough Cave, v.-c. 64.

H. sylvaticum Gouan var. **tricolor* W. R. L. Limestone ridges above Brough, W., 1892.

Taraxacum erythrospermum Andrz. Limestone near Ettersgill Beck, D., 1911.

T. palustre DC. var. **runcinato-hastatum* Lamotte (R. & F.). Above High Force Hotel towards Ettersgill Common, D., 1911 (*fide* J. W. White & C. Bucknall).

Campanula latifolia L. Field-sides N. E. of Brough, W., 1911. Clapham, v.-c. 64.

Gentiana campestris L. By the Tees between Winch and Shepherd's Bridges, v.-c. 65, 1911.

Symphytum tuberosum L. Near High Force, D., 1911. "Recorded from near Durham on the authority of E. Robson, but has not been seen recently." Baker & Tate, Fl. Northumb. and Durham, p. 230, 1868.

Myosotis alpestris Schm. Seen in three localities in 1892, two in Westmoreland, one in v.-c. 65: no doubt these are the stations recorded by James Backhouse in Nat. 1884, p. 12. It seems most scarce in its Yorkshire home, where, in 1911, only two or three blossoms were seen. It is evidently considerably affected by drought, as one of the Westmoreland localities, literally blue with thousands of flowers in 1892, was not nearly such a striking sight in the hot summer of 1911.

**Euphrasia Kerneri* Wettst. Near scars E. of Ingleborough Cave, v.-c. 64.

**Rhinanthus stenophyllus* Schur. Near Ribblehead, v.-c. 64.

Melampyrum pratense L. var. **ericetorum* Oliver. Stank Wood, near Appleby, W., 1911. Hills near Farther Rome, Giggleswick, v.-c. 64. Although the habit, shape of leaves, &c., seemed to bring the plants from both these localities under the *montanum* of Johnston, the toothed bracts seemed to oppose such a determination. This conclusion brought about a closer examination of more material and a comparison with the original descriptions of Johnston's *M. montanum* in his *Flora of Berwick-upon-Tweed*, 136 (1829), and D. Oliver's *M. pratense* var. *ericetorum* in Phytol. iv. 678 (1852). A further note by the latter writer (*op. cit.* 1078, 1853) seemed very much to the point, for there he argues that Johnston did not examine a full enough series to justify his specific characters of *montanum*, and comes to the conclusion that this plant is really but a montane form of *ericetorum*. This would appear to be actually the case, and thus the plants could be, I consider, more naturally arranged as *M. pratense* L. var. *ericetorum* D. Oliver, to represent the more widely spread (I believe) variety, with a "forma *montanum* (Johnst.)" (under *ericetorum*) for those who wished to differentiate the smaller-flowered, more delicate, usually montane plant with entire bracts.

Utricularia minor L. Cocket Moss, near Giggleswick, not flowering; v.-c. 64.

**Mentha rotundifolia* Huds. Swindale Beck, Brough, W., 1911. Mr. Arthur Bennett tells me that the late Mr. Martindale found this in the county in 1907.

Lamium hybridum Vill. Roadside between Clapham and Station, v.-c. 64.

Rumex domesticus Hartm. Between Ribblehead and Selside, v.-c. 64.

Cephalanthera ensifolia Rich. Wooded slope, Swindale Beck, Brough, W., 1892.

Habenaria chloroleuca Ridley. An interesting form of this occurs near High Force, with spike and individual blossoms of the size of *bifolia*, but the structure of the flowers seems entirely that of *chloroleuca*.

Allium oleraceum L. var. *complanatum* (Bor.). Limestone W. of Selside, v.-c. 64.

Scirpus setaceus L. Lane near Cocket Moss, near Giggleswick, v.-c. 64.

Carex curta Good. var. *fallax* Asch. & Graeb. Mickle Fell, at about 2400 ft., v.-c. 65, 1911.

C. ornithopoda Willd. Limestone hills above Brough, W., 1892.

C. fulva Host. East side of Ingleborough, v.-c. 64.

C. flava L. By the Tees near Winch Bridge, D., 1911.—Var. *lepidocarpa* (Tausch.). Near Malham Tarn, v.-c. 64.

C. Œderi Retz. var. *œdocarpa* And. By the Tees near Winch Bridge, D., 1911.

Avena pratensis L. var. *longifolia* (Parn.). Near Winch Bridge, D., 1911.

**Glyceria declinata* Bréb. Near the Ettersgill Beck, High Force, D., 1911. Lane near Cocket Moss, near Giggleswick, v.-c. 64.

Woodsia ilvensis Br. Seen in 1892, although as far back as 1868 it was reported as "now nearly or quite extinct."

Cystopteris alpina Desv. Seen on both visits, but in 1911 it was much cropped by sheep and no perfect fronds were noted.

**Polysticum Lonchitis* Roth. In 1892 one plant was seen on the Yorkshire side of Teesdale; in 1911 two or three examples in Durham territory. In Baker & Tate's Fl. of Northumb. and Durham (1868), it remarks—"Now nearly or quite extinct." Seemingly not on record for v.-c. 65.

P. aculeatum Roth. var. *lobatum* (Presl.). Forest-in-Teesdale, D., 1911. Swindale Beck, above Brough, W., 1911.

Botrychium Lunaria Sw. Forest-in-Teesdale, D., 1911.

Equisetum sylvaticum L. Roadside near Rome, Giggleswick, abundant, v.-c. 64.

E. palustre L. An interesting form of this with branches peculiarly "flattened" (as though pressed) and prostrate, occurred at a considerable height on Mickle Fell, v.-c. 65, 1911. Mr. Arthur Bennett agrees with me in thinking it must come very near var. *prostratum* Hoppe, but we have not seen any authentic material for comparison.

E. hyemale L. Swindale Beck, Brough, W., 1892 and 1911.

Chara fragilis Desv. var. **barbata* Gant. Pond near Brough on the Middleton Road, W., 1892.—Var. **delicatula* Braun. Malham Tarn, v.-c. 64.

C. contraria Kuetz. Malham Tarn, v.-c. 64.

C. vulgaris L. A small form with many uncoated segments occurred in a stream between Langdon and Widdy Bank Fell, D., 1892, and a form with prominent secondary cortical cells grew in a pool near Swindale Beck above Brough, W., 1911.

Nitella opaca Agardh. Pool near Winch Bridge, v.-c. 65, 1892.

NOTES ON JAMAICAN SPECIES OF CAPPARIS.

By William Fawcett, B.Sc., F.L.S., & A. B. Rendle, F.R.S.

(1) *Capparis cynophallophora* L. Sp. Pl. 504 is based on the plant *Capparis*, no. 2, of *Hortus Cliffortianus*, 204; Linnæus merely repeats the diagnosis from the earlier work. The full description given in *Hortus Cliffortianus* points unmistakably to the species usually known as *C. jamaicensis* Jacq.; Linnæus cites Pluk. Alm. 126, t. 172, f. 4, as a synonym, but states that the figure differs from his own plant, and omits this reference in the *Species Plantarum*. A dried specimen from the *Hortus Cliffortianus* in the National Herbarium is without doubt *Capparis*, no. 2, of *Hortus Cliffortianus*, as indicated by R. Brown's MS. note on the sheet. Further confirmation is found in the Linnean Herbarium, where there is a specimen of *C. jamaicensis* Jacq. named, in the handwriting of Linnæus, *C. cynophallophora*. In the *Systema*, ed. 10, 1071 (1759) Linnæus enlarges the diagnosis and cites references from Plumier (Ic. 73, f. 1) and Browne (Jam. t. 27, f. 1), and in the second edition of the *Species Plantarum* (p. 721), which has been mostly used by the older botanists as the starting-point for Linnean names, gives additional synonyms from Plukenet and Sloane, which, with the citation from Plumier, refer to another species, the one known generally as *C. cynophallophora*, not to *C. jamaicensis* Jacq. The quotation "Brown. Jam. 246, t. 27, f. 1" (*Breynia*, no. 1. *Fruticosa*, &c.), is somewhat doubtful, but the drawing of the calyx in the plate would point perhaps rather to *C. jamaicensis* Jacq. than to the other species. In his own copy of Browne's *Natural History of Jamaica* Linnæus has written *Capparis cynophallophora* against *Breynia*, no. 1., but there is no specimen from Browne in the Linnean Herbarium. The plant of Plumier, Plukenet, and Sloane is identical with Linnæus's *C. flexuosa* described on the next page (Sp. Pl. ed. 2, 722), and based on *Morisonia flexuosa* Amœn. Acad. v. 398. It is founded on a Jamaican specimen from Patrick Browne which is named "flexuosa" in Linnæus's hand in the Linnean Herbarium.

Under *C. siliquosa* L. Syst. ed. 10, 1071, are cited two references—"Brown. Jam. 246, n. 2," and "Pluk. Phyt. t. 327, f. 6." In his copy of Browne's *Natural History of Jamaica*, Linnæus has written "Capparis siliquosa" against the species in question, *Breynia*, no. 2. The original of Plukenet's plate is in herb. Sloane, and is *C. longifolia* Sw., apparently a distinct species, but flowers are unknown. In *Species Plantarum*, ed. 2, 721, Linnæus doubtfully includes the reference to Plukenet, and adds the remark, "Simillima præcedenti" (i. e. *cynophallophora*). In the Linnean herbarium there is, mounted on the same sheet with a specimen of *C. cynophallophora*, another specimen named by Linnæus *C. siliquosa*, which is only a form of *C. cynophallophora* L., and supports the view that *C. siliquosa* is conspecific with *C. cynophallophora*.

(2) *C. baducca* L., which follows *cynophallophora* in the *Species*

Plantarum, ed. 1, is similarly based on a reference to *Hortus Cliffortianus*, namely, *Capparis*, no. 3, p. 204; and the expression "foliis . . . per spatia confertis" clearly indicates *C. frondosa* Jacq. (Enum. Pl. Carib. 24), the name generally borne by this plant. The Asiatic plant referred to in *Hortus Cliffortianus* as β, from which Linnæus took the trivial name, is another species, but Linnæus incorporated this and the references under it as synonyms of *C. baducca* in the first edition of the *Species Plantarum*, and in the second edition added synonyms from Plumier & Browne, which again are different species.

(3) *Breynia indica* L. Sp. Pl. 503 is renamed *Capparis Breynia* in the *Systema* (ed. 10, 1759) and in the second edition of the *Species Plantarum*, but according to the rules of nomenclature, the original trivial name must be restored, and the species must be cited as *Capparis indica*.

(4) *C. ferruginea* L. Syst. ed. 10, 1071. Linnæus's diagnosis is probably based on Browne's specimen, which in his own herbarium is named "ferruginea" in Solander's hand. He cites Brown. Jam. t. 27, f. 2, which in the second edition of Browne's work (in which names have been added on the plates) is rightly named *Canella alba*, and there is a sheet of this species from Browne in the Linnean herbarium, which Linnæus has erroneously referred to "Baducca" (*cf.* Sp. Pl. ed. 2, 720). In *Amœnitates*, v. 398, Linnæus gives a fuller description of *C. ferruginea*, and in *Species Plantarum*, ed. 2, 721, 2, omits reference to Browne, t. 27, f. 2, but cites as a synonym "Cratæva fruticosa, &c., Brown. Jam. 247, t. 28, f. 1," which is undoubtedly the true *C. ferruginea*, and is thus named in Browne's second edition. In the text of his work Browne appends his tab. 27, fig. 2, to the description of "Breynia (3). Fruticosa, &c.," which is doubtless the same as "Cratæva (3). Fruticosa, &c., t. 28, f. 1," and bears the same common name, "Mustard Shrub with a willow leaf"; it is therefore a synonym of *C. ferruginea*, and in his copy of Browne's work Linnæus has written the name *Capparis ferruginea* against both these descriptions.

The names to be adopted for the Jamaican species and the synonymy are as follow:—

1. C. CYNOPHALLOPHORA L. Sp. Pl. 504 (1753), Hort. Cliff. 204 (1737), Syst. ed. 10, 1071 (1759) (excl. syn. Plum.), and Sp. Pl. ed. 2, 721 (1762) (excl. syn. Plum., Pluk. & Sloan.).
    C. siliquosa L. Syst. ed. 10, 1071 (1759) (excl. syn. Pluk.).
    C. jamaicensis Jacq. Enum. Pl. Carib. 23 (1760), Sel. Stirp. Amer. 160, t. 101, and Ed. Pict. 78, t. 150.
    C. torulosa Sw. Prodr. 81 (1788), and Fl. Ind. Occ. 932.
    C. Breynia Sw. Obs. 210 (1791) (non L. nec Jacq.).
    C. emarginata A. Rich. in Sagra Cub. x. 28, t. 9 (1845).
    Breynia 1. *Fruticosa, foliis oblongis obtusis.* Tab. 27, f. 1. Browne Hist. Jam. 246 (1756) (excl. syn.).
    Breynia 2. *Arborescens, foliis ovatis utrinque acuminatis, siliqua torosa longissima*, Browne *loc. cit.* (excl. syn.).

2. C. INDICA comb. nov.
   - *C. Breynia* L. Syst. ed. 10, 1071 (1759) (non Sw.).
   - *C. amygdalifolia* Jacq. Enum. Pl. Carib. 24 (1760).
   - *C. amygdalina* Lam. Encyc. i. 608 (1785).
   - *Breynia indica* L. Sp. Pl. 503 (1753).
   - *Ceratonia affinis arbor siliquosa &c.*, Sloane Cat. 153 (1696), and Hist. ii. 60.
   - *Salix arbor folliculifera*, &c., Pluk. Alm. 328, t. 221, f. 1 (1696).
   - *Breynia amygdali foliis latioribus* Plum. Nov. Pl. Amer. Gen. 40 (1703).
   - *Breynia elæagni foliis* Plum. *loc. cit.* t. 16.
3. C. LONGIFOLIA Sw. Prodr. 81 (1788), and Fl. Ind. Occ. 934.
   - *Salix folliculifera longissimis argenteis et acutis foliis* Pluk. Alm. 328, t. 327, f. 6 (1696).
4. C. FERRUGINEA L. Syst. ed. 10, 1071 (1759) (excl. ref. to Browne), Amœn. v. 398, and Sp. Pl. ed. 2, 721.
   - *C. elæagnifolia* Jacq. Enum. Pl. Carib. 23 (1760).
   - *C. octandra* Jacq. Sel. Stirp. Amer. 160, t. 100 (1763), and Ed. Pict. t. 149.
   - *Breynia* 3. *Fruticosa, foliis singularibus, oblongo-ovatis, superne nitidis, siliquis minoribus teretibus æqualibus* (excl. tab. 27, fig. 2), Browne Hist. Jam. 246 (1756).
   - *Crateva* 3. *Fruticosa*; *foliis singularibus oblongis utrinque acutis, subtus quasi villosis*; *floribus octandris, racemis comosis alaribus.* Tab. 28, f. 1. Browne *op. cit.* 247.
5. C. BADUCCA L. Sp. Pl. 504 (1753).
   - *C. frondosa* Jacq. Enum. Pl. Carib. 24 (1760), Sel. Stirp. Amer. 162, t. 104, and Ed. Pict. t. 153.
6. C. FLEXUOSA L. Sp. Pl. ed. 2, 722 (1762).
   - *C. cynophallophora* L. Syst. ed. 10, 1071 (1759) (with ref. to Plumier), and Sp. Pl. ed. 2, 721 (in part) (non Sp. Pl. 504).
   - *Morisonia flexuosa* L. Amœn. v. 398 (1760).
   - *Acaciis affinis arbor siliquosa &c.*, Sloane Cat. 153 (1696), and Hist. ii. 59.
   - *Capparis arborescens lauri foliis fructu longissimo* Plum. Cat. 7, Pl. Amer. (Burm.), t. 73, f. 1, and Ic. ined. ii. 36.
   - *Cynophallophorus*, &c., Pluk. Alm. 126, t. 172, f. 4.

SOME HEPATICÆ FROM THE ISLE OF MAN.

By J. B. FARMER, F.R.S.

THE object of this communication is to draw the attention of those who enjoy facilities for a study of the Hepaticæ of the Isle of Man to the circumstance that, so far as I am aware, little or nothing has yet been done towards recording the species that occur in the island. The subjoined list makes no pretence to be other than a very small contribution to the subject; the plants were all collected during a short visit in April, 1914, to the Marine Biological Station at Port Erin, followed by a two days' walk through the more hilly part of the island. It seems, however, to be worth while to publish this note, in order that others may, perhaps, be induced to extend the list, and to deal with the problems presented by the distribution of the plants within the Manx area. More extended search will unquestionably result in the recognition of many other indigenous species and genera.

Conocephalum conicum (L.) Dum., common.

Lunularia cruciata (L.) Dum., Port Erin.

Aneura multifida (L.) Dum., rather common.—*A. sinuata* (Dicks.) Dum., near Port Erin.—*A. pinguis* (L.) Dum., rather common.

Metzgeria furcata (L.) Dum., Colby Glen; Chasms, Port Erin.

Pellia epiphylla (L.) Corda, very common.

Alicularia scalaris (Schrad.) Corda, many forms of this variable species.

Eucalyx subellipticus (Lindb.) Breidl., wet rocks in Sulby Glen.

Aplozia crenulata var. *gracillima* (Sm.) Heeg., Laxy Glen.

Gymnocolea inflata (Huds.) Dum., roadsides through heather moors.

Plagiochila asplenioides (L.) Dum., Fleshwick Bay.

Lophocolea cuspidata Limpr., woods and banks.—*L. heterophylla* (Schrad.) Dum., woods and copses.

Chiloscyphus polyanthus (L.) Corda, below wet rocks behind Fleshwick Bay.

Cephalozia bicuspidata (L.) Dum., common.

Calypogeia Trichomanis (L.) Corda, common on the moors.

Diplophyllum albicans (L.) Dum., common.

Scapania nemorosa (L.) Dum., Sulby Glen.—*S. undulata* (L.) Dum., Sulby Glen, &c.

Lejeunia cavifolia (Ehr.) Lindb., rocks near Port Erin.—*L. cavifolia* var. *planiuscula* Lindb., Colby Glen.

Frullania dilatata (L.) Dum., common on tree-trunks in damp copses and woods.—*F. Tamarisci* (L.) Dum., amongst moss, not uncommon.

Anthoceros lævis L., Sulby Glen.

It will be noticed that several genera which might have been expected to furnish species to be included in the above list are conspicuous by their absence from it. Thus *Lepidozia*, *Lophozia*, *Fossombronia*, *Madotheca*, *Radula*—to mention only a few of the more prominent ones—were not encountered, although it seems hardly likely that they are really unrepresented. In any event the geological and general physical character of the island, as well as its geographical position, should serve to render the study of its hepatic flora both attractive and interesting.

ALABASTRA DIVERSA.—PART XXIV.[*]

By SPENCER LE M. MOORE, B.Sc., F.L.S.

(Continued from p. 98.)

II. **Rhamphogyne**, *Asteroidearum* gen. nov. (Plate 530 B.)

Capitula heterogama, disciformia, pauciflosculosa, flosculis ext. ♀ int. ♂. Involucrum ovoideum e phyllis paucis sub-2-seriatis membranaceis sistens. Receptaculum parvum, planum, nudum. Corollæ parvulæ, oblongæ, fll. fem. 3-dentatæ, fll. hermaph. 3–4-dentatæ. Antheræ 3–4, apice haud appendiculatæ, basi rotundatæ, oblongo-ovoideæ, cito sejunctæ. Ovarium superne in rostrum deflectum excurrens. Styli fll. hermaph. rami breves, complanati, appendicibus papillosis sibi ipsis fere æquilongis onusti. Achænia compressa, calva, longe rostrata. — Herba perennis, nana, cæspitosa, ramosa. Folia alterna, imbricata, pinnatifida vel integra. Capitula parva, ad apicem ramorum solitaria necnon sessilia.

RHAMPHOGYNE RHYNCHOCARPA, sp. unica. *Abrotanella rhynchocarpa* Balf. fil. in Phil. Trans. R. Soc. clxviii. 352, tab. 27 A.

Hab. Rodriguez Island; *Dr. J. B. Balfour*.

The genus *Abrotanella* being essentially Antarctic, the alleged occurrence of a species in the Island of Rodriguez seemed to be a point worthy of examination. The figure cited above, very good except for a most important omission, represents a plant that might pass muster as a somewhat abnormal member of the genus to which it is referred. The style-arms, however, of the hermaphrodite florets with their papillose appendages are not those characteristic of the tribe *Anthemideæ*. By some oversight these have been omitted from the drawing, the only style-arms shown being those of a female floret, although the style of the hermaphrodite florets is said in the description (*l. c.*) to be "alte bifido, ramis ciliatis." In fact, this plant undoubtedly belongs to the *Asteroideæ*, and should find a place in the neighbourhood of *Dichrocephala*. The most peculiar feature about it is the curious beaked ovary and achene.

III. DECADIA Lour.

The characters Loureiro[†] gives for this genus are succinctly as follow. A persistent 3-leaved calyx; corolla of ten petals; stamens about 30, adnate to the base of the petals; superior ovary with a filiform style and somewhat fleshy stigma; fruit a 3-celled drupe. The plant he calls *Decadia aluminosa*, but assigns no place to it among *Dicotyledones*. Blume[‡] suppressed *Decadia* in favour of *Dicalyx*, also a genus of Loureiro's, but printed near the end of the work already cited and a good way after *Decadia*. This is rather curious in view of the discrepancies in the two descriptions drawn up by Loureiro; moreover, as will be seen directly, Blume could not have examined the type of *Decadia aluminosa*, although he claims that name as a synonym for his *Dicalyx aluminosus*. Wight and Arnott* remark about Loureiro's plant that it "appears to be a species of *Symplocos*." Meisner,† writing shortly afterwards, is in doubt about it, and places it with a note of interrogation in *Tiliaceæ* and in *Ternstrœmiaceæ* as well as in *Rosaceæ*, finally following Wight and Arnott in thinking it a *Symplocos*. Endlicher ‡ sinks *Decadia* in *Symplocos*, but with doubt, and the same conclusion is reached by De Candolle § on the authority of a specimen of *S. spicata* in herb. Hamilton under the name of *Decadia spicata*. For Lindley || *Decadia* is synonymous with *Symplocos*. Bentham and Hooker ¶ are more cautious, and in the absence of material for examination consider the position of *Decadia* uncertain; Baillon appears to have passed it by unnoticed; Gilg** follows Blume unhesitatingly. Brand in his monograph of *Symplocaceæ* †† makes *Dicalyx aluminosus* Bl. a synonym of his *Symplocos aluminosa*, but in doing this he expressly excludes Blume's synonym, i.e. *Decadia aluminosa* Lour., neither can I find mention of the latter anywhere in the monograph in question. Moreover, under *S. aluminosa* he remarks that *Dicalyx aluminosus* has been indicated as equivalent to *Symplocos spicata* Roxb., but he cannot confirm this, as of the three Blume specimens named *Dicalyx aluminosus* in the Leyden herbarium none is *S. spicata*, two being types of new species—*S. aluminosa* Brand and *S. syringoides* Brand, while the third is *S. ferruginea* Roxb. The position to-day is therefore that *Decadia* is one of those puzzles only to be solved by examination of the types upon which they have been founded.

---

[*] The types of the species described are in the National Herbarium.

[†] Fl. Cochinch. 315 (1790).

[‡] Bijdr. 1116 (1826).

The British Museum, as is well known, shares with Lisbon and Paris the distinction of possessing types of Loureiro's collecting, and among those at the first-named establishment is a sheet of specimens written up *Decadia aluminosa* in Loureiro's own hand. There are no open flowers on these, but buds alone although in a fairly advanced state. Dissection shows Loureiro's diagnosis to be wrong in two vital particulars. The supposed 3-leaved calyx resolves itself into the bracts (or bract and two bracteoles) beneath the flower characteristic of the subgenus *Hopea* of *Symplocos*, while the ovary, instead of being superior, is wholly inferior and not even half-superior, as is the case with some species of the genus. Loureiro's plant is therefore without the possibility of doubt a *Symplocos*.

As to the species—that is a more difficult matter. While it is certainly near *S. spicata* there are reasons for suspecting the conspecificity of the two. It cannot be *S. aluminosa*, which is

---

* Prodr. Flor. Ind. Or. 82 (1834).

† Plant. Vasc. Gen. ii. *passim* (1836–43).

‡ Gen. Plant. 1411 (1836–40).

§ Prod. viii. 246 (1844).

|| Veg. King. ed. ii. 593 (1847).

¶ Gen. Plant. ii. 668 (1876).

** Engler & Prantl, Pflanzenfam. iv. i. 168 (1891).

†† Pflanzenreich, 6 Heft, iv. 242 (1901).

described as having a paniculate inflorescence (the inflorescence of *D. aluminosa*, if branched at all, is branched only at the very bottom); moreover, the pedicels are said to equal or exceed the calyx in length (those of *D. aluminosa* are exceedingly short) and the stamens are about forty. *S. ferruginea* with broader leaves has stout ferrugineous spikes (*D. aluminosa* has them very slender) and larger flowers. The description of *S. syringoides* fits our plant well except for its young branches being alluded to as ferrugineous-tomentose, a condition impossible to affirm in the other's case, what indications of young branches there may be pointing to ordinary pubescence. On the whole, I think it likely that *D. aluminosa* may be *S. syringoides*, and as such it has been written up provisionally in the National Herbarium.

IV. Dicalyx cochinchinensis Lour.*

Brand places this at the end of his monograph † among the doubtful species with the note: "Sine dubio optima species, sed adhuc specimina non sunt nota." There is a sheet of this in the National Herbarium, and although, the flowers being in young bud, the specimens leave something to be desired, one can determine the affinity of the species with but little doubt as to the validity of the conclusion reached.

Of course the organs Loureiro describes as a 3-leaved outer calycine whorl are, as in the last case, three bracts. The rest of the characters, generic and specific, given in the description are in the main correct so far as the specimens enable one to tell, except that the flowers are said to be hermaphrodites and females on different plants; so far as I have been able to study the matter, they seem to be either hermaphrodite or male, and so to answer the "polygamo-masculi" sexual character given by Brand as of occasional occurrence in the genus. Although, owing to the early state of the flowers, the andrœcium cannot be properly examined, there seems no reason to doubt that our plant is referable to § *Bobua*. The description is appended.

Symplocos cochinchinensis, comb. nov. Ramulis sat validis ferrugineo-tomentosis celere glabris, foliis elongatis oblongo-obovatis basi in petiolum validum canaliculatum ferrugineo-tomentosum coartatis margine apicem versus serrulatis ceterum integris chartaceis supra glabris pallideque nitentibus subtus sparsim puberulis, paniculis axillaribus terminalibusve foliis brevioribus ferrugineo-tomentosis, floribus secus inflorescentiarum ramulos pseudospicatis, bracteis pedicellum brevissimum occludentibus late ovatis obtusis vel obtusissimis extus ferrugineo-tomentosis, calycis segmentis oblongis obtusis extus sericeis, corollæ segmentis oblongis obtusis extus sericeis, staminibus circiter 80?, ovario semi-infero 3?-loculo, bacca ampulliformi glabra in sicco rugosa brunnea.—*Dicalyx cochinchinensis* Lour.

Folia pleraque 15–20 cm. long., 4·5–6 cm. lat., in sicco viridia

---

* Fl. Cochinch. 663.

† *Op. cit.* 90.

vel plus minus rubiginosa; petioli ± 1 cm. long. Panicula circa 5 cm. long. Bracteæ 2–4 mm. long. Calyx 2 mm. long. Bacca sicca 6 mm. long., summum 4 mm. lat.

Affinity with *S. floridissima* Brand; differing from it, *inter alia*, in foliage, the densely tomentose panicles and nearly sessile flowers.

V. Asclepiadaceæ duæ Africanæ prætervisæ.

Schizoglossum Eylesii, sp. nov. Caule ultrametrali simplici e radice tuberoso-fusiformi stricto inferne nudo alibi sat crebro folioso inferne tereti eximieque striato glabrescente superne subtiliter pubescente, foliis sessilibus brevissimeve petiolatis anguste linearibus acutis margine revolutis præsertim in pag. inf. costa centrali eminente subtiliter pubescentibus in sicco arrectis, umbellis pluribus lateralibus sessilibus 5–6-floris, bracteis parvulis linearibus extus pubescentibus scariosis diutule persistentibus, pedicellis floribus subæquilongis pubescentibus, calycis segmentis lanceolatis acutis corolla brevioribus, corollæ alte partitæ lobis oblongis obtusis dorso sparsim pubescentibus intus glabris, coronæ phyllis ægre ex basi columnæ stamineæ certe brevioris oriundis scutiformibus apice rotundatis intus perspicue bicarinatis et paullulum infra apicem appendicem lanceolatam superne incurvam sibi ipsis paullo breviorem gignentibus, antherarum alis prominentibus appendicibus ovatis supra stigma inflexis.

Hab. Rhodesia, Mazoe, alt. 4800 ft.; *F. Eyles*, 500.

Radicis pars tuberosa 4 cm. long., summum 1 cm. diam. Caulis circa 12 dm. alt., juxta basin 2·5 mm. diam. Folia inferiora ± 7·5 cm. long., 1–2 mm. lat.; petioli dum adsint 1 mm. long.; folia juniora gradatim imminuta, sc. usque ad 15 × ·5 mm. vel etiam minus, omnia in sicco grisea. Bracteæ circa 1·5 mm., pedicelli summum 5 mm. long. Calycis segmenta 2·2 mm. long. Corollæ lobi 3 mm. long., 1 mm. lat. Coronæ phylla 3 mm. long.; pars basalis 1·75 × 1·25 mm.; appendix 1·25 mm. long. Columna staminea 1·5 mm. long. Antherarum alæ ægre 1 mm. long., appendices ·8 mm. Pollinia anguste oblonga, ·6 mm. long.; glandula ·25 mm., caudiculæ ·2 mm. long.

This has much the appearance of *S. strictissimum* S. Moore, but different flowers. Its place in the genus is next *S. fuscopurpureum* Schlechter & Rendle, which differs in habit, leaf, and corona.

Fockea Monroi, sp. nov. Caule verisimiliter repente primo tereti subtiliter pubescente deinde angulato glabro, foliis oblongis vel anguste oblongo-lanceolatis apice obtusissimis ipso mucronatis basi in petiolum brevem angustatis firme membranaceis leviter scabriusculis, cymis interpetiolaribus abbreviatis paucifloris, bracteis minutis ovatis acutis scariosis ut cymarum axis pedicelli calycis segmenta necnon corollæ facies exterior pubescentibus, pedicellis calyci æquilongis, calycis segmentis triangularibus obtusis vel obtuse acutis, corollæ tubo calyce breviore lobis a basi lata oblongis revolutis æstivatione tortis, corona circa 15-fida dentibus subulatis interdum bifidis acuminatis dente inter-

medio quam laterales majori tubo ligulis 5 elongatis integris vel bifidis fere usque ad apicem tubi eidem adnatis carinasque formantibus parte libera ex tubo longe eminente onusto addita ligula satis elongata etsi tubo inclusa integra vel bifida carinis quibusque memoratis infra medium tubi affixa basique integra vel dentata, antherarum appendicibus oblongis quam antheræ circiter ter longioribus, folliculis fusiformibus glabris.

Hab. Rhodesia, Victoria; *Monro*, 828, 837.

Folia plerumque 4–7 cm. long., 8–10 mm. lat., in sicco viridia; costa media supra plana subtus eminens; petioli 2–3 mm. long., supra excavati. Pedicelli 2–2·5 mm. long. Calycis segmenta 2 mm. long. Corollæ tubus 1 mm. long., lobi 15 mm. long., juxta basin 2 mm. lat., superne 1 mm. vel etiam minus. Coronæ tubus ægre 5 mm. long., hujus dentes 1–1·5 mm. long.; ligulæ 4 mm. long.; ligulæ inclusæ 2 mm. long. Columna staminea 1 mm. long. Antherarum alæ ·5 mm. long., appendices fere 2 mm. long. Pollinia pyriformia, ·25 mm. long. Folliculus 12·5 cm. long., inferne fere 2 cm. superne circa 1 cm. lat. Semina 9 mm., coma 3·5 cm. long.

Differs from *F. Lugardi* N. E. Br., *inter alia*, in the small leaves, the distinctly pedicelled flowers, the longer segments of the calyx and the longer corona with different toothing.

No. 942, of the same collector, also from Victoria, with closer and shorter branching, smaller leaves (2–3·5 cm. × 4–6 mm.), and somewhat reduced flowers, is a plant apparently conspecific with the above, but growing under different conditions.

VI. Conyza decurrens Linn.

Under *Monenteles Pterocaulon* A. P. de Candolle* remarks: "An forte *Conyza decurrens* Lin. sp. 1206 eadem aut affinis?" This in spite of the fact that Linnæus gives India as the locality of his species, whereas *M. Pterocaulon* was founded on a Madagascar plant of Bojer's collecting. Linnæus's description (*l. c.*) is short and almost valueless for purposes of identification; so that but for the fortunate circumstance of there being specimens of *C. decurrens* in the Linnean herbarium at Burlington House, no answer to de Candolle's query would be possible. Examination with Dr. B. D. Jackson's kind help of the Linnean material showed *C. decurrens* to be conspecific with an unnamed *Pterocaulon* in the National Herbarium collected by Bojer: this latter is without locality, the only note accompanying the specimens being to the effect that its Madagascar name is "Ari-androo-vavi."

It now became necessary to ascertain whether Bojer's specimens just mentioned were referable to *Monenteles Pterocaulon* DC. I therefore forwarded to M. Casimir de Candolle a small scrap, together with a photograph of the sheet of Bojer's specimens taken by Mr. D. A. Rendle, with a request to that gentleman that he would kindly compare this material with the type of *M. Ptero-*

---

* Prod. v. 455.

caulon in his herbarium. M. de Candolle was good enough to do this, with the result that he has no doubt about the correctness of his grandfather's surmise. Under these circumstances, *M. Pterocaulon* being unknown from India, one must conclude that Linnæus was mistaken in supposing *C. decurrens* to be a native of that country.

The plant appears to have become established in Mauritius, and in connection with that fact has received the name of *Pterocaulon Bojeri* Baker.* The synonymy therefore stands as follows:—

PTEROCAULON DECURRENS, comb. nov.
Conyza decurrens Linn. Sp. Pl. ed. ii. 1206 (1763).
Monenteles Pterocaulon DC. Prod. v. 455 (1836).
Pterocaulon Bojeri Baker Fl. Maur. 164 (1877).

Besides Bojer's material, the species is represented in the National Herbarium by the following:—North-west Madagascar, Pasandava Bay; *Hildebrandt*, 3014. Central Madagascar; *Rev. R. Baron*, 1321. North Madagascar; *ibid.*, 6461.

DESCRIPTION OF PLATE 530.

A. *Muschleria angolensis.* 1. Open inflorescence. 2. Congested ditto. 3. A flowering capitulum, × 4. 4. A floret, × 5. 5. Anthers, × 10. 6. Ripe achene, × 16.

B. *Rhamphogyne rhynchocarpa.* Style-arms, × 16.

A NEW BERTYA.

BY R. A. DÜMMER.

WHILE engaged on the Conifers of the Lindley Herbarium, Cambridge, my attention was drawn to a specimen included among the Podocarps of that collection, which was doubtfully referred to that genus by Lindley. This plant was collected by Fraser in the Barrens, north of Arbuthnot's Range, in Australia, and turns out to be an undescribed species of *Bertya*, of the natural order *Euphorbiaceæ*, for which therefore the name *B. neglecta* is proposed. *Bertya*, a genus comprising approximately fourteen species, is limited to Australia and the adjacent island of Tasmania, and includes a series of shrubs, some of an ericoid aspect, of which *B. gummifera* merits cultural attention.

The species under consideration, of which the female flowers are as yet unknown, has the superficies of *B. rosmarinifolia*, but is immediately distinguished from it by its more glabrescent character, the presence of minute spinules which clothe the twigs and the leaves, the relatively larger male flowers and the ten larger bracts which subtend them.

Bertya neglecta, sp. nov. A bushy heath-like shrub. Current year's twigs subumbellately disposed, erect, straight and rigid, usually unbranched, 4–12 in. long, terete or angulate towards their extremities, dull brown, spinulose and sparingly pilose, densely leafy. Leaves ascending and subimbricate, or eventually spreading, borne on broad flattened petioles scarcely exceeding $\frac{1}{24}$ in. long, the blade linear, obtuse or truncate at both ends, $\frac{1}{3}$–1 in. long, averaging $\frac{1}{10}$ in. in breadth, thickly coriaceous, minutely and sparingly spinulose, the upper surface with a median groove, decidedly convex on account of the revolute thickened and entire margins, the lower surface sparingly pilose and spinulose with a broadened and conspicuous midrib. Flowers solitary in the axils of the upper leaves, arranged racemosely, the inflorescences up to $2\frac{3}{4}$ in. long. Male flowers when unopened broadly ovoid, when mature cylindric and $\frac{1}{4}$–$\frac{5}{12}$ in. long, shortly pedicellate, subtended by ten imbricate persistent bracts, the lower six small oblong or triangular and thickened, the upper four thinner in texture and larger, ovate to oblong, rounded or subacute, and up to $\frac{1}{10}$ in. long; anthers crowded and spinally arranged on a thickened ascending axis.

---

* Fl. Maur. 164.

Bertya neglecta, sp. nov. *B. rosmarinifoliæ* Planchon affinis sed ramulis foliisque minute spinulosis glabrioribus, floribus ♂ majoribus, bracteis 10, differt.

A NEW ARCTOTIS.

By R. A. Dümmer.

Arctotis Scullyi, sp. nov. Fruticosa, sparsim ramosa, ramis validis dein breviter subhispidulis, foliis sessilibus planis lanceolatis vel lineari-oblongis acutis nisi acuminatis integris vel raridentatis lobatisve crasse coriaceis utrinque (ut scapus) arcte subhispidulo-pubescentibus, scapo terminali monocephalo, involucri phyllis exterioribus parvis triangularibus caudato-acuminatis interioribus multo majoribus oblongis obtusis cite glabris.

A shrubby plant of unrecorded height, slightly hispid all over and with stout angled sordid brown scabrous shortly harsh-haired current year's twigs, the internodes being $\frac{1}{6}$–1 in. long. The leaves are ascending and often overlap, have a broad insertion but do not clasp the axis, are flat, lanceolate or linear oblong, acute or acuminate, usually broadest about or below the middle, $1\frac{1}{2}$–$2\frac{1}{2}$ in. long, $\frac{1}{6}$–$\frac{1}{3}$ in. broad, thickly leathery, and thickly clothed on both sides with a brownish or whitish short harsh pubescence, penninerved; the margin is entire or possesses two obscure teeth or lobed about or above the middle. Scape terminal, short, 1–3 in. long, bearing one flower-head, terete, harsh-haired, nude or with a few small leaf-like bracts towards its base. Flower-head averaging $1\frac{1}{2}$ in. across, the lower involucral scales small, triangular and tipped with a hairy caudate acumen, the upper much larger, oblong, scarious, concave, obtuse or rounded at their apices, glabrous at maturity, up to $\frac{7}{12}$ in. long, and $\frac{1}{6}$–$\frac{1}{5}$ in. broad. Ray-florets averaging 1 in. long, $\frac{1}{12}$–$\frac{1}{10}$ in. broad, probably whitish.

Arctotis Scullyi falls in the section *Euarctotis*, characterized by the tuft of hairs which arise from the base of the achene and surrounds the latter, and is probably most closely related to *A. bellidifolia*, from which, however, its sessile not basally clasping leaves, their scabridity on both surfaces, and their different conformation differentiate it immediately. Its discovery is due to the efforts of Mr. W. C. Scully (no. 221; ex herb. Bolus, 9615), who, during a several years' sojourn in Little Namaqualand, collected numerous plants, many of which still await description. The region alluded to is one of the richest as regards annuals in South Africa, and includes in particular an abundance of Composites, many of which are of singular beauty, and would assuredly repay the trouble of introduction.

SHORT NOTES.

Leucojum vernum L. and Galium Vaillantii DC. in Somerset.—For some years Miss M. A. Hellard has known the Spring Snowflake in a locality between Bishop's Lydeard and Williton, v.-c. 5, where she kindly showed it to me in good flower towards the end of last February. Time did not allow me to make a thorough search; but a friend who went down to see it, a few days later, found that it extended (by and near a brook) for almost a third of a mile. It has the appearance of a native; but I am not yet sure about its true status. The Bedstraw, previously known in this county only as a casual at Twerton, near Bath, was plentiful in potato-fields, &c., near Ashcott Station, and also occurred near Shapwick Station, v.-c. 6, last September.—Edward S. Marshall.

The Early Season.—On May 1st I gathered in a wheat-field on stiff clay in the parish of Norton, Herts, flowering and fruiting specimens of the Corn Gromwell (*Lithospermum arvense*) ten inches high, and with well-developed fruits. Some of the white blossoms had a slight pink tinge, whereas in the mountains on the Continent they are not infrequently pale blue. Hawthorn was in blossom by April 28th on Norton Common and elsewhere in the vicinity.—H. S. Thompson.

REVIEWS.

Researches on the Irritability of Plants. By Tajadis Chunder Bose, M.A., D.Sc. Longmans, Green & Co. 1913.

In this publication Prof. Chunder Bose has added to his previous work in this important field of physiology a faithful account of a unique series of experiments, rendered possible by his own ingenious invention of recording apparatus.

The author states it to have been his aim to make the plant accurately self-recording and subject to automatic stimulus, so as to eliminate as far as possible the personal factor from the experiments.

Only those with like aims can appreciate to the full the success that Prof. Chunder Bose has attained in this direction, but the veriest tyro must be struck with the beauty and precision of his automatic inventions—the oscillating recorder and the resonant recorder. In both, friction between the writing point and the writing surface is overcome by intermittent contact; in the former by vibration of the writing surface, in the latter by vibration of the writing point. The resonant recorder was invented to provide a means of recording minute time-measurements of hundredths of seconds. This can be done very accurately by means of the intermittent recorder, providing that the oscillation period remain constant. The author has very ingeniously made use of the principle of resonance and ensured regularity of contact by timing electro-magnetic impulses to synchronize with the natural frequency of the recording index.

Prof. Chunder Bose has also used greatly improved methods of stimulation, capable of quantitative variation, and including various electric and electro-thermal methods of excitation.

With these improved methods he has been able to analyze experimentally the phenomena of stimulus and response, as seen in the sensitive plants *Mimosa*, *Biophytum*, &c. One of the most successful results thus obtained is the demonstration of a latent period strictly comparable to that shown by animal muscle under stimulation.

The ordinary fall of *Mimosa* leaf under stimulation is accompanied by development of a galvanometric negativity, but it is found that, when the stimulus is applied at some distance from the responding organ, a slight positive response appears before the much more marked negative one. The author claims that his experiments show that all stimulations are dual, but that unless separated by time of travel, the stronger masks the weaker effect.

Prof. Chunder Bose's main thesis is that the plant exhibits true physiological phenomena of excitation, conduction and contraction, and that there is the most striking parallelism between muscle action and plant movement. Thus the plant shows the additive effect of repetition of minute stimuli; increase of response with increase of stimulus, and, most striking of all, a complete reversal of direction of movement after over-stimulation. The latter fatigue phenomenon strictly parallel with relaxation of muscle on over-stimulation.

Our author, believing Pfeffer's results to have been inconclusive, has paid particular attention to the question of the transmission of stimulus, and claims, and we think rightly, that the present more extensive experiments prove the co-operation of the living protoplasm in the process; in short, that it is a physiological and not merely a physical conduction.

One cannot but wish that circumstances had allowed of the author discussing the results from the point of view of general plant physiology, as there are many interesting aspects which would bear comparison with other physiological processes, as, for instance, the accumulative effect of stimulation, also seen in geotropic movements; the apparent presence of an optimum, &c.

The author has noted a depression of excitability on rainy days, which he attributes to absorption of water by the pulvinus. One is not quite convinced that there may not be another interpretation of the results following upon application of water to the pulvinus, and still more so in connection with retardation of excitability on rainy days.

Prof. Chunder Bose is much to be congratulated on furnishing such valuable additional data—data which must be taken into account in all future considerations of this difficult subject. They should prove of interest and value to animal as well as plant physiologists, and we can but hope that he will still further add to the debt we owe him by investigating the nature of the differential excitability to which he attributes the movement of the pulvinus.

E. N. T.

An Account of the Morisonian Herbarium in the possession of the University of Oxford, together with Biographical and Critical Sketches of Morison and the two Bobarts and their Works and the Early History of the Physic Garden (1619–1720). By S. H. Vines, M.A., F.R.S., Sherardian Professor of Botany in the University, and G. Claridge Druce, Hon. M.A., Curator of the Fielding Herbarium. 8vo, cloth, pp. lxviii, 350, with portraits. Oxford: The Clarendon Press. Price 15*s*. net.

This is a companion volume to the *Account of the Dillenian Herbaria* which was issued by the same Press in 1907, and was noticed in this Journal for that year (p. 282), and is yet another tribute to Mr. Druce's well-known energy; for though Professor Vines, who in the earlier volume appeared as editor, is here placed as joint author, it may safely be assumed that the bulk of the undertaking has fallen to Mr. Druce's share.

The book consists of two parts, the first containing the history of the Oxford Garden, with full biographies of the two Bobarts (1599 ?–1680; 1641–1719), whose names are so intimately associated with its foundation and history, and of Robert Morison (1620–1683), the first Professor in the University. These biographies, each of which is accompanied by a portrait, are exceedingly well done; the history of the various publications of Morison and the younger Bobart is worked out in so much detail and with so great care that it can hardly be expected that future commentators will be able to supplement it. One small detail may, however, be added: the original figures in Morison's *Plantarum Historia* were, according to Stokes (With. Arr. ed. 2, 1), "chiefly by Bobart," the editor of the book. It may be well to supply the reference to the "collection of British plants, made chiefly from Oxon, made by Plot and named by Bobart," which are indicated as "in the British Museum (Nat. Hist.)": these are in vol. 113 of the Sloane Herbarium; other plants connected with Plot are in H. S. 168.

The identification of the plants of the Morisonian Herbarium is preceded by an account of the Herbarium itself and a list of the collectors whose plants it contains. These largely correspond with the contributors to the Sloane Herbarium, formed somewhat later, an account of which it is known will be published by the Trustees of the British Museum, though not as immediately as was suggested by a note inserted in this Journal (1913, 316) during the absence of the Editor. The Herbarium consists of about 6,500 specimens, including many not named in the *Historia* but identified here; we can well believe that their identification has been "a long and laborious task," even when alleviated by the expert assistance which the authors acknowledge. Whether it was worth all the trouble that has been expended upon it is, of course, a matter of opinion; the authors point out that as the collection was not formed by Morison but was "organized by the younger Bobart," "it might be consequently inferred that none of the specimens illustrating [Morison's] volume can be regarded as 'type-specimens'; but there can be no doubt that Bobart was quite familiar with Morison's species, sufficiently so as to render the specimens authoritative for reference." We ourselves do not think the identification of first importance, inasmuch as a cursory inspection of the detailed list shows that in many instances more than one plant is represented under the same name: thus "C. Madraspatensis panicula sparsa" is represented by two if not three species (p. 116), and a note on the following page on a specimen identified as "*Juncoides niveum* (L.)"* shows "a double error" of a complicated kind. There is, we cannot but think, considerable danger of basing too much upon the specimens and their identification: thus, without necessarily endorsing Dr. Robinson's conclusions as to the nomenclature of *Oxalis corniculata*—his paper is in Journ. Bot. 1906, not "1907"—we do not consider that they are disposed of, as the authors (p. 13) seem to think, by the correction of one of the synonyms quoted by Linnæus. A more thorough examination of the book would doubtless afford further matter for remark, but the publishers by issuing the volume uncut have not rendered its contents readily consultable. There is an excellent index of plant-names, but none of the collectors cited nor of the English localities or counties in which British specimens were collected; both of these would have been useful to those who consult the book, which, whatever opinion may be formed as to its positive utility, must certainly take rank as a monument of industry.

---

* This appears to be a new combination, as do "Juncoides sylvaticum (Huds.)" (p. 113), "Centaurium spicatum (Pers.)" (p. 57) and others similarly indicated; these, we presume, will have to be cited as of "Vines & Druce."

Plant Physiology.

Vorlesungen über Pflanzenphysiologie. By Dr. Ludwig Jost. Third edition. Pp. 760+11 plates+188 figs. Jena: Gustav Fischer. 1913. Price 16 marks.

Plant Physiology. By Dr. Ludwig Jost. Supplement to the English Translation by R. J. Harvey Gibson. Pp. 168+7 figs. Oxford: The Clarendon Press. 1913. Price 2*s*. 6*d*. net.

The third edition of Prof. Jost's well-known work on Plant Physiology is very welcome to botanists. Immediately on its first appearance in 1904 it was recognised as the best general survey of the subject within the moderate compass of a single volume. Of course, the work did not compete at the time with the fuller treatise of Pfeffer, though it was certainly far more readable. However, the last part of Pfeffer's work was published in 1904, while Jost's book has been kept steadily up to date and so is now indispensable as a presentation of the physiological work of recent years. The new edition is well up to the standard of the two earlier ones, for the very voluminous literature of the last few years has been, in the main, admirably dealt with. One finds an adequate account, within the space available, of most important recent investigations, such as that of Willstätter on the chemistry of chlorophyll, the new work on the nature of the respiratory process by Palladin and others, investigations on the permeability of protoplasm, &c. The illuminating results of various workers in the United States on the wilting coefficient are, however, not adequately treated by the statement that two workers have confirmed in the case of wheat Sachs's results with tobacco. Sachs was certainly a pioneer in this work, but he touched only the fringe of the subject, and his results should certainly give place to those of recent workers. Again, in discussing the question of the control of transpiration by stomatal movement, fuller reference should have been made to the recent work of Lloyd and Francis Darwin. Such small irregularities of treatment are inevitable in a work of this scope; the wonder is that the general level is so high, since the labour of compilation must have been very heavy. The bibliographical references, instead of following each chapter as in previous additions, are now distributed as footnotes in the text; this is a great improvement.

The second book is a supplement to the English translation of Jost's work. That it should come for review at the same time as the *third* German edition does little credit to the Clarendon Press. The English edition was a translation of the *first* German edition, and appeared in 1907, in the same year as the *second* German edition. There were a number of mistakes in the English edition, and it was, of course, partly out of date very shortly after its appearance. It has taken six years to rectify the mistakes and bring the English edition up to the level of the second German edition by means of this supplement which incorporates the alterations in that edition. As a result of this long delay, which seems inexcusable, the supplement appears at the same time as a new German edition, and the English rendering again falls behind. Apart from its being already out of date, the supplement is very troublesome to use, as it has to be compared page by page with the English edition. Nothing less than an early translation of the third German edition will now be satisfactory to botanists, nor, we may add, consonant with the dignity and reputation of the Oxford Press.

V. H. B.

BOOK-NOTES, NEWS, &c.

The "Report for 1913" of "The Botanical Exchange Club and Society of the British Isles" becomes yearly less and less obviously connected with the Club and more and more a medium for the expression of the views of Mr. Druce, the Secretary, upon various botanical matters and above all for the publication of the "comb.-nov." of which he is so expert—we had almost said so unscrupulous—a manufacturer: the stronger expression was suggested by finding (p. 344) *three* new names suggested for the same plant! We have more than once expressed an opinion, which we know is widely if not universally shared, as to the unfortunate obsession which can regard work of this kind as in any way tending to the advance of science, and it seems useless to protest further against Mr. Druce's action. Suffice it to say that in the present "Report" he seems to have surpassed himself, and the proposed recognition of John Hill's accidental binominals has afforded him a new opportunity for the display of his powers in this direction. The "Report" has not reached us for notice, so we are excused from saying anything more about it. It is noteworthy that Mr. Druce says that his opinion "in no way assumes to carry with it the authority of the Club."

From a printed circular which, though headed "private and confidential," is sent out with the "Report," we learn that Mr. Druce is "anxious to raise a sum of £200 in order to be able to publish a history of the London Botanical Society, to reprint a few of the earlier Reports of the Club, to publish a general Index to the whole of the Reports, to put the Society in a more satisfactory financial position." As to the first object, assuming that by "the London Botanical Society" the Botanical Society of London is intended, we are glad that Mr. Druce proposes to act on the suggestion made in this Journal for 1911, p. 352; "no one," as we then remarked, "could do it better." The others seem to us of more doubtful utility: the last we do not understand—"the Society" cannot be that previously mentioned in the same sentence: does it refer to the "Society of the British Isles," which sprang into existence as a *nomen nudum* on the titlepage of the Exchange Club Report for 1910 (see Journ. Bot. 1911, 325), and has, so far as we know, never received the diagnostic character necessary to recognition?

The Annals of the Bolus Herbarium is a new periodical, of which two parts (price 5s. net each) will appear each year. It is a small quarto, edited by Dr. Pearson, the Professor of Botany of the South African College, Capetown, in connection with which it is issued: the present number contains forty-four well-printed pages and six plates executed by some not very pleasing process: the figures themselves however are informative and useful. A portrait of Dr. Bolus appears as frontispiece: the papers are on the Flora of the Great Karasberg, with an introduction by Dr. Pearson and a list of the plants collected by F. and L. Bolus and M. W. Glover, to which the plates relate; a description of a new genus of *Irideæ* (*Pillansia*) by F. Bolus, which is not figured; a Key to the Spermaphyta of the Cape Peninsula; and a review of Dr. Moss's *Vegetation of the Peak District*, which doubtless "contains much that should be of interest to students of the vegetation of S. Africa," but seems somewhat out of place here.

At the meeting of the Linnean Society on March 5th, a paper was read by Mr. C. F. M. Swynnerton, entitled "Short Cuts by Birds to Nectaries," illustrated by lantern-slides from photographs and drawings made by the author during his travels in Africa. He stated that birds were watched visiting flowers, and flowers were examined for indirect evidence. Not only sunbirds (which indeed are often great evaders of pollen), but many other birds as well, visited certain flowers freely for their honey, and were probably of use to them for cross-fertilization. Certain birds, and some individuals more than others, apparently disliked being besprinkled with pollen, and tended always to enter flowers by breaches made by themselves or their predecessors. Other birds tried, contrariwise, to enter the flowers by their natural openings and so to be of use to them for cross-fertilization, *excepting* in the case of individual flowers that happened, through inconvenience in their own or the bird's position, &c., to offer some difficulty. If these were insufficiently protected as well, they were often either pierced or the openings already made in them by the more indiscriminating birds were utilized. Insects also tended to utilize the breaches made by birds, and so probably in large part failed to counteract the latter's discriminative influence. In most cases the eliminative effect, if any, of the damage was not traced. In two instances it was (for individuals) immediate and clear, flowers of a certain type being bodily removed.

At the meeting of the same Society on April 2nd, Mr. R. Allen Rolfe, A.L.S., exhibited a series of coloured drawings of five hybrid Ophryses, raised by M. Fernand Denis, Balaruc-les-Bains, France, from *Ophrys tenthredinifera*, Willd., crossed with the pollen of *O. aranifera* Huds.; together with the two parents. This is believed to be the first hybrid *Ophrys* raised artificially, and it proves the origin of a natural hybrid that has been recorded from three localities in Italy, and is known under the names of *O. Grampinii* Cortesi, and *O. etrusca* Asch. & Gräbn. The hybrids varied somewhat between themselves, but all showed an unmistakable combination of the characters of the two parents, particularly in the colour and markings of the lip, and in the peculiar combination of rose and green in the sepals and petals. M. Denis has a batch of some forty seedlings in flower or bud. At least eighteen natural hybrid Ophryses have been recorded, and Mr. Rolfe believed there were others. He would be greatly obliged to anyone who would send him examples at the Kew Herbarium, as he is studying them.

At the meeting of the same Society on May 7th, Mr. H. N. Ridley gave an account of "The Botany of the Utakwa Expedition, Dutch New Guinea," which had been worked up by various botanists. He stated that the extensive collection of plants made by Mr. C. B. Kloss during Mr. Wollaston's expedition to Mount Carstensz, Dutch New Guinea, in 1912–13, is the most important collection of New Guinea plants brought to this country. In spite of the large collections made by Dutch and German collectors, there are upwards of five hundred new species and eight new genera in the collection, many of great interest. The plants were collected at various heights from sea-level to an altitude of about 13,000 feet, where vegetation ceased. The areas explored may be divided into four botanical regions:—(1) The Coastal region, where the flora was largely of Malayan affinity. (2) The foothills, ranging from 500 to 3000 feet elevation, an area of dense forest, the flora still typically Malayan but containing a distinct Australian element. (3) The Frontal mountain belt from 3000 to 8000 feet elevation, the begonia and balsam region. Here cultivation ceased. Palms disappear, and the first of the Palæarctic forms are met with, such as *Viola*, *Ranunculus*, *Hypericum*, and *Galium*. (4) The main mountain range. Here the big forest trees disappear, and herbaceous plants show a marked increase. Casuarinas, *Pandani*, and Violets form a conspicuous part of the flora. The highest tree is *Podocarpus papuanus*, sp. nov. This attains an altitude of 10,500 feet. Above 11,000 feet the rocks became too steep for most plants, the only plants being rhododendron bushes, a daisy (*Myriactis*), some grasses and mosses. The flora of this upper region from 8000 feet upwards comprised many Palæarctic forms, *Geranium*, *Thalictrum*, *Astilbe*, *Euphrasia*, *Potentilla*, *Gentiana*, &c., with the Australian types, *Pterostylis* and *Corysanthes*.

We regret to announce the recent deaths of Mr. William West, Mr. J. A. Martindale, and the Rev. E. N. Bloomfield, of whom notices will appear in due course.

The address of the Rev. H. J. Riddelsdell is now Wigginton Rectory, Banbury.

Lafayette. Manchester.

WILLIAM WEST, F.L.S.

IN MEMORY OF WILLIAM WEST.
(1848–1914.)

(WITH PORTRAIT.)

By W. Denison Roebuck, F.L.S.

By the death of William West, which took place at Bradford on May 14th after a brief illness, this Journal has been deprived of one of its most valued contributors. His first paper, "Bryological Notes," appeared in 1881, and from that time until 1912, when he published a long and interesting paper on the Flora of Shetland, "with some ecological observations," hardly a volume has appeared without a contribution from his pen. As these contributions—a small portion of his literary output—show, he was a man with an extraordinarily wide and varied range of information. He had a competent knowledge of all branches of field botany, and his attainments in plant physiology and morphology showed that, had he been specially interested in those branches of study, he would have made his mark as an original investigator. But it was as a student of the freshwater algæ, and especially of the Desmids, that he obtained his world-wide reputation. In this department he was one of the foremost men of his time, and the numerous papers and memoirs contributed to various journals and to the Transactions and Proceedings of learned societies testify to his unflagging energy and zeal in the pursuit of his favourite study. As a systematist he has been for many years recognized as an authority on the freshwater algæ, and he has also made valuable contributions, in numerous memoirs, to our knowledge of their distribution and biological relationships.

William West was a native of Leeds, a city which has produced not a few naturalists of distinction, and was born February 22nd, 1848, on the edge of Woodhouse Moor. He studied for the pharmaceutical profession, eventually qualifying and being registered on November 16th, 1870, and removing to Bradford in 1872, set up in business there. He was married in 1874 to Hannah Wainwright, also a native of Woodhouse Moor, Leeds, who died in 1904, leaving two sons and a daughter, all of whom inherited their father's ability, the sons passing through Cambridge University with high distinction, and both of them taking up botanical work. The elder, William, died in India in 1901 (see Journ. Bot. 1901, 353); the younger, George, is now Professor of Botany at the University of Birmingham.

In 1886 William West took up science teaching as a profession, and was appointed Lecturer in Botany, and afterwards also in Biology and Pharmacology at the Technical College, Bradford. He was remarkably able and successful as a teacher, gaining the respect and affection of his students to an extraordinary degree.

The Yorkshire Naturalists' Union was established on its present lines in 1877, and West was one of the band of able naturalists who were instrumental in making it the powerful and successful instrument of local scientific research which it has been ever since. He became Secretary of the Botanical Section in succession to Dr. H. Franklin Parsons, but his professional duties prevented his taking much active part in its work after these first few years. He was elected President for 1899, a significant mark of the appreciation of the esteem in which he was held by his fellow Yorkshiremen. He became a Fellow of the Linnean Society on March 17th, 1887; he was also a member and frequent attender at the meetings of the British Association, and Secretary of its Botanical Section in 1900 at Bradford.

In the earlier years (1878–1887) of West's scientific work he was an all-round botanist with a wide and accurate knowledge of all the groups both of flowering and flowerless plants, being gifted with a powerful and retentive memory and remarkable powers of observation. He published numerous notes about this time, dealing with such subjects as Mosses (1878), the Autumn Flora of Whernside (1879), a February stroll near Baildon (1881), the principal plants of Malham (1883), the plants of the Bradford district (1886), Buckinghamshire Lichens (1880), the Roses of Towton Battlefield (1879), &c. He contributed a considerable amount of material to Lees's *Flora of West Yorkshire* (1888), after which he began to concentrate his energies on the freshwater algæ, the *Desmidiaceæ* especially. His son George was now co-operating in these studies, and the practical self-training of the father and the parental and academic training of the son, based upon a combination of practical field-work and an appreciation of specific and varietal differentiation with a capacity for broad and sound generalization, began to yield fruit in no small degree. Theirs was no mere local study, the whole world was now their sphere of investigation, and the command of the complete literature of their subject and of innumerable gatherings from almost all parts of the globe, with the willing co-operation of European and American workers, enabled the two Wests to establish themselves among the foremost students of their subject.

William West's remarkable knowledge of cryptogamic plants of all kinds and of their conditions of growth made him a unique personality in Britain, probably in Europe. He was an ecologist long before the term itself was coined, always fully conscious of the importance of the common and dominant forms. The algological investigations which were now his main line of research were most systematically and diligently carried on. Holidays were utilized to the full for visiting all parts of the British Islands, especially the outlying montane regions of Scotland and Ireland, North Wales, and the English Lakes. The work began near home, and their native county of York was worked, a list published for each of its Ridings, and finally in 1900–1901 a complete alga-flora of the county. Then came papers dealing with North Wales (1890), the English Lake district (1892), the West of Ireland (1892), Scotland (1893), the South of England (1897), the North of Ireland (1902), the Orkneys and Shetlands (1905), and the Clare Island Survey (1912), many of which were published in this

Journal. European countries were left to Continental workers, except for papers dealing with Denmark (1891) and Portugal (1892). But material was sent to them from many parts of the world, and this formed the basis of memoirs published for the American States of Maine (1888, 1891) and Massachusetts (1889), and for the West Indies (1894, 1899). For the Old World were published papers on Singapore (1897), Koh Chang (1901), Ceylon (1902), Burma and other parts of India (1907), and Kinabalu and North Borneo (1914); meanwhile another able Leeds algologist, Mr. W. Barwell Turner, had monographed the Desmids of India. The Wests dealt with Madagascar in 1895, Central Africa in 1896, and Welwitsch's African collections in 1897, and (in 1911) the freshwater algæ collected by the Shackleton Antarctic Expedition.

Besides these more serious undertakings, numerous notes were published in various journals, as well as articles of more general scope and import, including memoirs on the Conjugation of the Zygnemaceæ (1891), and Observations on the Conjugatæ (1898).

Speaking generally, the earlier papers (to 1893 or so) appeared as by William West alone, the later ones by himself and his son jointly; but the co-operation in the work had extended over the whole series, and of later years the algological work fell to the son, while the father devoted time to the study of the ecology of the bryophytes and lichens.

Finally came the publication of their culminating work by the Ray Society—the *Monograph of the British Desmidiaceæ*; of this four volumes have appeared (1904, 1905, 1908, 1911), while two remain to be completed by the surviving author.

These algological investigations did not, however, exhaust the potentialities of the subject, and led up to another line of investigation, that of the phytoplankton of lakes and rivers. In this the two Wests were the pioneer British workers, and they took up the task in characteristically full and systematic fashion. Aided by grants from the Government Grant Fund and from the Royal Irish Academy, the detailed field work was begun about 1900, and Western and Southern Scotland, the lakes of England and North Wales, those of Western and South-western Ireland, as well as Lough Neagh, Malham Tarn, and the rivers Ouse, Lochay, and Bann, were visited during the vacation seasons of several years. The results of these plankton researches proved to be of high importance, and were summarized in the *Proceedings of the Royal Society* for 1909. From a biological point of view the British Lakes are of great interest, the researches of the two Wests showing that the lake-plankton of extreme Western Europe, and particularly of the British Islands, differs completely from that of Central Europe, being characterized by the presence and dominance of Desmids. Their observations showed that Desmid-plankton occurred only in rich Desmid-areas, and that these rich areas were directly correlated with montane areas, with heavy and persistent rainfall, and, most important of all, with the presence of the oldest rocks, Archæan and the older palæozoic rock-formations; and their success in working out this new line of research has produced significant results which were a revelation and a surprise to Continental observers.

The last subject which occupied West's attention was the ecology of cryptogams, on which a paper—the first of a projected series—was read in abstract at the Linnean Society at the meeting on June 18, a month after his death: of this an abstract will be found on p. 191.

The personality of William West endeared him to all with whom he came into contact. He was a man of warm enthusiasms, with a singular charm of manner and a quiet vein of genial humour, and those who, with the present writer, have been on most intimate terms with him for nearly forty years, can best appreciate what manner of man he was, and feel the greatness of the loss which they have sustained by his succumbing to heart failure supervening upon an attack of his old enemy asthma. He was followed to his resting place in Schotemoor Cemetery, Bradford, by a great number of his old students and his old friends.

The accompanying portrait is reproduced from a photograph taken by Messrs. Lafayette, of Manchester.

NOTES ON SOME PLANTS OF MID-PERTH.

By Rev. E. S. Marshall, M.A., F.L.S.

The greater part of last July was spent at Fortingal, v.-c. 88, where there is an excellent hotel; Messrs. W. A. Shoolbred and C. E. Salmon joined our party for most of the time, and we had the pleasure of again meeting Mr. D. A. Haggart, who accompanied us on several occasions. At the beginning of September Dr. C. E. Moss and I had three days' collecting in the same district, which is quite rich, as Messrs. Lintons' papers of over twenty years ago indicated. This vice-county has, I suppose, been better worked than any other in the Highlands, so that novelties must be few and far between; such supposed additions are starred. The Lyon Valley hereabouts is rich in *Thalictrum.* I doubt whether restricted *T. minus* L. (*T. collinum* Wallr.) occurs there; but a plant closely allied to *T. majus* auct. angl. is frequent, as well as the one referred by the Lintons to *T. Kochii* Fr., of which it has the ovoid fruit.

**Caltha radicans* Forster. One luxuriant specimen occurred by a streamlet on the south side of Ben Lawers, at about 2000 ft.; usually it is a low-ground plant.

Erophila inflata Hook. fil. ascends to fully 2600 ft. on Ben Lawers; the pods are shorter and often less inflated than in my gatherings from Glen Shee, E. Perth, and between Altnaharra and Tongue, W. Sutherland, perhaps owing to the greater altitude.

Cochlearia micacea E. S. Marshall. Abundant on the north side of Meall Garbh; very local on the north side of Creag Mohr. It occasionally descends to about 2600 ft., and on Ben Lawers reaches 3950 ft.; but the main range is between 3000 and 3500 ft. The long-podded form is scarce on these mountains; a very few pink-flowered plants were observed. In cultivation I find it to be a rather short-lived perennial; but I suspect that it is usually biennial, in the wild state. The dense cushions of early bloom are very striking and pretty.

Arenaria rubella Hook. A specimen from the west side of Ben Lawers measures five inches across.

A. leptoclados Guss. var. *viscidula* Rouy & Fouc. Dr. Moss detected this on a roadside wall near Coshieville.

Hypericum maculatum Crantz (*dubium* Leers). What appears to be a form of this, very different from our ordinary English one, being of low growth, with much paler flowers, was found in good quantity by the roadside between Fearnan and Lawers, and sparingly near Bridge of Lyon, Fortingal.

Vicia sylvatica L. Very fine by the Allt Odhar, Fortingal, and by the Allt Coire Pheiginn, at 700 ft.; not observed elsewhere.

Agrimonia Eupatoria L. We collected (for *A. odorata* Mill.) flowering examples of a luxuriant Agrimony, fairly plentiful among bushes and rocks on the cliffs above Fortingal, from 500 to 1100 ft., with large, glandular leaves; but Mr. Arthur Bennett suggests *A. Eupatoria* var. **sepium* Brébisson, Fl. Norm. 110 (1869), which may be the same as var. *umbrosa* Coss. & Germ., Fl. Paris. 182 (1845).

Galium erectum Huds. One fine plant on limestone near Garth Castle; Mr. Haggart informed me that he had seen it more plentifully, eastwards. The habit is diffuse; and Mr. Bennett refers it to var. *aristatum* Bab. Man. ed. 3, 153 (1851), *English Botany*, t. 2784 (non *G. aristatum* L.).

Antennaria dioica Gaertn. Plants agreeing with the description of var. *pedicellata* B. White, *Scottish Naturalist*, 1886, p. 323, were gathered on a hillock north-east of Garth Castle.

Crepis mollis Aschers. (*succisæfolia* Tausch). Fine and plentiful, just north of Garth Castle; very local in Glen Lyon, about four miles above Fortingal. No definite station in the county was known to Dr. White; but I understand that it has been gathered near Killin by Messrs. H. and J. Groves.

Taraxacum spectabile Dahlst. Meall Garbh, Creag Mohr, &c.; apparently quite common on the mountains.

Hieracium anglicum Fr. The type and *H. iricum* Fr. grow by the Lyon at several spots, though neither is abundant.

H. sinuans F. J. Hanb. Sparingly by the stream at the foot of Fin Glen, north-east of Ben Lawers, at 1600 ft.; it ascends to nearly 3000 ft. on Ben Lawers itself, but is rare in this district.

H. nigrescens Willd. Typical, but extremely scarce, by the Inverinain Burn, below Meall Garbh, between 1800 and 2000 ft.

H. submurorum Lindeb. Specimens agreeing best with this were found at 1700 ft. by the Allt Odhar stream, north-west of Fortingal, among shaded rocks. Heads not quite so black as in typical examples; but the rather low elevation may account for this, and I cannot refer them to anything else.

H. rubicundum F. J. Hanb. Stream-sides in Fin Glen, between 1600 and 2000 ft., very scarce; differing from type in the ligules being very ciliate and the styles very dark, but Rev. E. F. Linton agrees with me that it belongs to this species. Only recorded from Killin, in Perthshire.

H. argenteum Fr. Rocks by the Lyon, two miles below Fortingal, as well as higher up the river.

H. Sommerfeltii Lindeb. Rocks at the east end of the Stuich-an-lochan, Ben Lawers, from 2700 to 3000 ft.; the dark-styled form.

H. pseudonosmoides Dahlst. Locally frequent by the Lyon, and on rocks above it.

H. callistophyllum F. J. Hanb. Typical, but very rare, by the stream in Fin Glen, at 1600 to 2000 ft.

H. sylvaticum Gouan var. *micracladium* Dahlst. Allt Odhar, at 1700 ft.; scarce.

H. variicolor Dahlst. Not uncommon; but both Mr. Linton and I find it hard to draw a clear line between this and *H. rotundatum* Kit. The leaves are, as a rule, more elongated; when in shade, their blotches tend to disappear. Keltney Burn; Allt Odhar; streams below Meall Garbh (north side); rocks above the road from Bridge of Lyon to Fearnan. In this neighbourhood its range is from 2000 down to 1400 ft., with one exceptional station at about 400 ft.

**H. subulatidens* Dahlst. Mr. Linton concurs in referring to this some luxuriant, shade-grown specimens, with remarkably long foliage, found by the Allt Odhar, at 1700 ft.

H. rivale F. J. Hanb. Stream-sides, Fin Glen and Allt Odhar, at 1700 ft.

H. sagittatum F. J. Hanb. var. *subhirtum* W. R. Linton. Fin Glen; Allt Odhar; Inverinain Burn; by the Lyon, near Invervar. Locally frequent, ascending to 2000 ft.

H. euprepes F. J. Hanb., type. An alpine black-headed form occurs on cliffs at the east end of the Stuich-an-lochan, Ben Lawers, at nearly 3000 ft.—Var. *glabratum* Linton. In many places by the Lyon, often very luxuriant, with lower peduncles up to nine inches long; near Garth Castle; Fin Glen; eastern cliffs of the Stuich-an-lochan, Ben Lawers. From 300 to 2700 ft.

**H. farrense* F. J. Hanb. One fine plant, in a shady ravine 300 yards north of Garth Castle.

H. eustales Linton. Fin Glen and Inverinain Burn, between 1600 and 2000 ft.

H. cæsiomurorum Lindeb. Allt Odhar, and by the Lyon, near Invervar, at about 700 ft.

H. dissimile Lindeb. Rocks above the road from Bridge of Lyon to Fearnan (1400 ft.); Allt Odhar (1700 ft.); the usual Scottish form.

H. Dewari Bosw. Near the Keltney Burn, &c.

H. gothicum Fr. Abundant on a grassy, bushy hillock near

Garth Castle, often as the forma *latifolia* W. R. Linton. An abnormal form of the type with *sooty* styles was collected on slopes above the Lyon, about six miles above Fortingal.

**H. sparsifolium* Lindeb. This name is suggested by Mr. Linton for a yellow-styled hawkweed found on low rocks at the north-east end of Loch Tummel. It closely resembles one from near Inchrory, Banffshire, which his brother placed here, and under the type, in 1905; also (allowing for difference of situation) some much taller specimens from the Shee Water, two miles below Spital of Glen Shee, 1892. I think that all of them belong to this species.

H. strictum Fr. Near the Keltney Burn, and in two or three places by the Lyon, but not plentiful.

H. reticulatum Lindeb. Frequent and often remarkably fine in Glen Lyon; sometimes the leaves are untypically efloccose beneath.

H. corymbosum Fr. var. *salicifolium* (Lindeb.). Keltney Burn, and a little above Bridge of Lyon.

Armeria maritima Willd. A very fine form of this, which I believe to be Syme's var. *planifolia*, grows in wet ground on the north side of Creag Mohr, from 2200 to 2500 ft.

Mimulus moschatus Douglas. Well established in a muddy ditch about five miles above Fortingal, Glen Lyon.

Euphrasia gracilis Fr. A form with white (instead of blue or reddish) flowers was noticed on a dry bank near the road, two miles west of Lawers Inn. Fine *E. Rostkoviana* Hayne (*E. officinalis* L., *vera* ?) is abundant in the low ground.

Rhinanthus Drummond-Hayi Druce. Very local on the northern slopes of Creag Mohr, at 2200 ft.

Melampyrum pratense L. var. **ericetorum* Oliver? Bushy hillock east of Garth Castle, in plenty. The name was given to it by Mr. Salmon, and it seems to agree quite well with the description in *Phytologist*, 1852, p. 678; but I have not seen Irish specimens. In the stronger plants the bracts are decidedly toothed, not entire, as in var. *montanum*. I have found precisely the same thing at Wybunbury Bog, Cheshire.

Mentha piperita L. Established in bushy ground near the Lyon, three-quarters of a mile below Fortingal. Mr. Salmon determined it as *α. officinalis* (Hull), our normal form.

Polygonum æquale Lindman. Common in Glen Lyon, below Fortingal; named by Dr. Moss. It varied a good deal; one of the forms agrees with the plant figured by Syme as *P. aviculare* var. *arenastrum*.

Betula alba L. × *pubescens* Ehrh. var. *microphylla* E. S. Marshall. Two trees of this hybrid combination, which seems to be new, grew with the parents by the Allt Coire Pheiginn, west of Garth Castle, at 700 ft., both being good intermediates (*B. pubescens* var. *microphylla* is frequent in the district). Dr. Moss and I agreed in this determination.

Alnus glutinosa Gaertn. The only form observed is var. *microcarpa* Rouy (*teste* Moss).

Salix caprea L., var. *sphacelata* Wahlenb. Allt Coire Pheiginn

(700 ft.); stream descending from the north side of Meall Garbh (1600 ft.); both certified by Dr. Moss. Probably frequent in glens of the Highlands; I am inclined to think it a good average variety.

S. nigricans × *phylicifolia*. An excellent intermediate was found by Dr. Moss and myself on Ben Lawers, very little below 3000 ft.

Taxus baccata L. Not native; but two trees of considerable age grow on the cliffs above Fortingal, at 700 and 1100 ft., doubtless bird-sown from the very ancient yew in the churchyard.

Habenaria conopsea Benth. A variation with deep claret-coloured flowers was noticed in the Lyon valley, below Fortingal.

Polygonatum verticillatum All. Apparently new for the Breadalbane district; shown to us by Mr. Haggart in a rocky ravine, associated with *Convallaria majalis* L.

Juncus biglumis L. Meall Gruaidh (or Greigh); head of Fin Glen; north side of Creag Mohr.

Eriophorum latifolium Hoppe. Hill-bog, west of the Lawers Burn, at 1200 ft.; extending only over a very limited area.

Kobresia bipartita Dalla Torre (*caricina* Willd.). Occasionally reaches 3000 ft. on the Ben Lawers range; it occurs on the north side of Creag Mohr.

Carex aquatilis Wahlenb. A tall, slender form was met with in profusion near the west end of Loch Tummel.—Var. *virescens* And. By the Lyon, about six miles above Fortingal; confirmed by Mr. Bennett.

C. atrofusca Schkuhr. We obtained this in two corries (about a mile apart) of a mountain, south of Glen Lyon, for which it was not known before; one fruiting stem measures sixteen inches, and several were fully a foot high. The leaves have a decidedly *glaucous* hue, which I have not seen mentioned; Mr. Druce is evidently right in placing it between *C. atrata* L. and *C. rariflora* Sm. We found the altitude to vary from 2300 to about 3000 ft.

C. fulva × *Œderi* (type). Northern shore of Loch Tummel, in small quantity; the hybrid of *C. fulva* with *C. Œderi*, subsp. *œdocarpa* And. is quite common, as usual.

**C. inflata* Huds. (*rostrata* Stokes) × *vesicaria*. Marshes at the head of Loch Tummel, showing considerable variation.

Agrostis nigra With. Native in grassy ground by the river at Fortingal; we also gathered it in Mr. Druce's station near Lawers Inn, but less dark-flowered.

Poa nemoralis L. An intensely glaucous plant, apparently var. *cæsia* Gaud., is abundant on the upper cliffs above Fortingal, from 1000 to 1200 ft.

**Glyceria declinata* Bréb. Muddy ground near Fortingal Hotel; also close to Lawers Inn.

Equisetum arvense L. What I know as 'var. *nemorosum* Braun' grows in damp shade at Fortingal, and by the road from Bridge of Lyon to Fearnan.

**E. arvense* × *limosum* (*E. litorale* Kühlewein). South shore of Loch Tummel, near the shooting-lodge; also at the north-west end. In both cases the parents were associated with it; the terminal cones, by no means freely produced, are very small and abortive. New for Scotland; but probably overlooked.

E. variegatum Schleich., *a. arenarium* Newm. A few plants on Meall Garbh, at 2600 ft., and by Loch Tummel, where it is associated with *Myrica gale* and *Schœnus ferrugineus*.

A NEW CHIMAPHILA FROM SAN DOMINGO.

By Sidney F. Blake, A.M.

While working recently on the variations of the widely distributed Winter green known as *Chimaphila umbellata* (L.) Bart.,* I was struck by the marked difference from all other specimens in the British Museum shown by those collected in San Domingo by Baron Türckheim, and referred on the label to this species. Although the plant has long been known to range over a large part of temperate Europe and Asia, nearly all of North America from Canada to the mountains of Mexico and Guatemala, and Japan, its presence in the West Indies has only recently been indicated by Urban (Symb. Antill. v. 453 (1908)), on the basis of specimens collected long ago by Eggers; but a careful examination of Türckheim's specimens, which are in fresh flower, and of duplicates at Kew of Eggers' plant, which is in old fruit, shows that they represent a decidedly distinct species. Not only are the leaves much smaller and fewer-toothed, but the peduncle and pedicels, densely dotted with glandular atoms in all the forms of *C. umbellata*, are here perfectly glabrous, while the filaments, widened and short ciliate near the middle in *C. umbellata*, in the San Domingo plant are enlarged nearer the base and are quite glabrous. In view of these marked characters the San Domingo plant seems best considered an endemic species which may bear the name

Chimaphila domingensis. Planta humilis 10–15 cm. alta; foliis cuneato-obovatis obtusiusculis subsessilibus 1·8–2·5 cm. longis 6·5–8 mm. latis dentibus 2–5-jugis hebetibus; pedunculis (et pediculis) glaberrimis 4–6 cm. longis; floribus 3–5 subumbellatis ca. 11 mm. latis; sepalis orbicularibus glaberrimis margine minute eroso non ciliato; petalis suborbicularibus minute irregulariter erosis (purpureis fide Eggers (apud Urban), sed in specim. Türckheimianis certissime albidis); antheris violaceis; filamentis basi ovate ampliatis glaberrimis.

Santo Domingo: pine woods, alt. 2200 m., Valle Nuevo, near Constanzu, August, 1910, *Türckheim*, 3434 (type in Brit. Mus.); among stones, alt. 2270 m., Valle Nuevo, May 30th, 1887, *Eggers*, 2269 (hb. Kew.).

I am indebted to Dr. Rendle for permission to dissect a flower from the Türckheim specimens in the British Museum.

---

* This combination has been universally quoted from Nutt. Gen. i. 247 (1818), but can hardly be considered made there, as no synonym is cited; however, it had been properly made the previous year by Barton (Veg. Mat. Med. U.S. i. t. 17, t. 1 (1817)), as indicated by Gray, Syn. Fl. U.S. (1818).

THE MANX SAND-DUNE FLORA.

By J. W. Hartley and J. A. Wheldon, F.L.S.

Early in June of the present year we spent half a day on the sand-dunes of the north coast of the Isle of Man. Our chief object was the collection of lichens, but we were also desirous of comparing the vegetation of these dunes with the flora of the similar but more extensive eolian sands of the coasts of Lancashire and Cheshire. The season was too early for a thorough investigation of the higher plants, and we are sensible that the lists given are far from complete. Sufficient, however, was noted to show that these dunes are of a totally different type from those of Southport, Wallasey, or St. Anne's. The area of blown sand is not extensive, commencing near Jurby and extending in a narrow belt towards Point of Ayre. Inland the dunes overlie and merge into the boulder clay, which eventually rises into a range of low hills following the coast-line. At Point of Ayre there is a wide expanse of barren heath, where the blown sand only partially covers extensive beds of shingle, and does not form dunes properly so called.

In many places the sand has been blown away except where held by the roots of ling and heather, exposing the shingle or boulder clay beneath. The moorland then bears a not distant resemblance to the peat-hags of our moorland summits, only the peaty bases of the stools are composed of sand instead of peat. This ground looked interesting, and appeared to be especially rich in *Cladoniæ*, which were fine and well-developed. Unfortunately we arrived too late to give it an adequate examination, and darkness coming on we were reluctantly compelled to leave the exploration of this Point of Ayre heathland for a future excursion.

As compared with that of Southport, the flora of these dunes is poor and uninteresting. The species are fewer and of a less specialized dune-type. The differences which immediately strike the observer may be briefly summarised :—

(1) The dunes are comparatively flat, and provide less variety of aspect than those of the mainland. The absence of high dunes and intersecting deep hollows, besides affecting the flora, diminishes the picturesqueness of their appearance.

(2) The whole of the coast we examined, both dunes and heathland, was very dry. There are no wet "slacks." The flora is therefore more uniformly mesophytic and xerophytic than at Southport, the rich bryological and hydrophytic associations of the latter locality not being represented.

(3) The absence of *Salix repens*, a dominant species of the Lancashire dunes, enhances the general flatness; the secondary dunes built up by this species adding greatly to the diversity of the surface when it is present.

(4) The calciphilous species are less prominent, the restricted calciphile species being absent.

(5) The larger fungi are very scarce, much more so than on the damper dunes of the mainland, where, from May onwards,

they may always be seen in profusion. Not a single species was noticed on this occasion, and only one or two on a previous visit, some years ago, in September.

(6) The rapid transition from the sand-dune vegetation to that of heathland, with the presence of *Pteris*, *Calluna*, *Erica*, and *Ulex*, all of which are either excessively rare or absent from the Lancashire dunes, is especially noteworthy.

The causes which bring about these differences are apparently twofold. The dominant factor is probably the great depth of the subsoil water, due perhaps to the sand overlying pebble beds derived from the boulder clay. We were informed that at Point of Ayre it was possible to dig a depth of some seventeen feet without reaching water. At Southport, on the contrary, it lies only a few inches beneath the surface of the deeper hollows, and often stands in pools. Another factor, which probably strongly affects the vegetation, is the apparently smaller lime content of the soil. Shells are less plentiful in the sand, most of which is probably derived from the boulder clay of the north of the island. The bulk of sand is also smaller than that delivered to the estuarine dunes of the mainland. Owing to this deficiency of material, or to the steeper inclination of the land, the dunes are less extensive and of slower growth, and appear to go through a constant alternation of growth and demolition. The high boulder clay banks in the vicinity prevent the spread of blown sand to any considerable distance inland, and the material is not supplied in sufficient quantity to enable the dunes to make any marked advance on the seaward margin. Here in several places there is abundant evidence of recent erosion.

The poverty of species will be evident on perusal of the following list, which, whilst doubtless very incomplete, probably includes the majority of the plants found at the several points visited. The *List of Plants of the Isle of Man*, published by the Rev. S. A. Kermode, does not help much, as localities are rarely quoted, but some of those he enumerated may possibly have been from this area. If so, they are certainly not obtrusively evident. Amongst those he names which are likely to occur are *Glaucium luteum*, *Crambe maritima*, *Trifolium striatum*, *T. arvense*, *Anthyllis vulneraria*, *Carlina vulgaris*, *Leontodon hirtus*, *Erythræa Centaurium*, *Euphorbia Paralias*, *E. portlandica*, and *Sedum acre*. Most of these are abundant on the drier Lancashire dunes, and there seems to be no adequate reason for their absence here, if they really are absent.

About Jurby and Lhane several well-marked zones of vegetation could be discerned.

I. *The Strand Association.*—This in some places is developed on shingle, in others on sand. It forms an almost continuous band dominated by *Atriplex*, amongst which we were able to distinguish (although not yet flowering) *A. hastata* L., *A. Babingtonii* Woods, and *A. laciniata* L. Other plants observed were *Cakile maritima* Scop., *Glaux maritima* L., *Arenaria peploides* L., and *Salsola Kali* L. On pebbles where the ground was shingly a few minute lichens develope. On a few pebbles brought home for examination we found *Acarospora pruinosa* Jatta f. *nuda* Nyl. ex Lamy., *A. smaragdula* Ach., and *Rhizocarpon confervoides* DC. f. *fuscescens* Leight and f. *dispersa* Leight. We did not observe at any of the points visited a fringing zone of *Agropyron junceum*, such as may be seen between Ainsdale and Birkdale, but the species occurs sparingly on the coast.

II. *The Marram Association.*—The dunes rise rather abruptly from the strand, in some parts in a continuous slope, in others with a low steep scarp. In the latter case the freely exposed roots of Marram grass show that erosion by tide or wind has taken place. This grass is the dominant plant, and the slightly undulating dunes it forms are neither as lofty nor as much cut into hills and valleys as those of the mainland. After reaching their maximum height, which is low as compared with the dunes between Formby and Southport, they fall in a gentle slope towards the land, forming a depression or shallow valley, which roughly and with some interruptions follows the contour of the coast-line. There are a few deeper hollows in which water probably stands for a short time in wet seasons, but there are no permanently wet "slacks." In these hollows a number of mosses and lichens carpet the ground, but none of them are of a distinctly hydrophilous type.

The following species of this association were recognizable at this early season of the year:—

Ammophila arenaria Link, dominant.

Agropyron junceum Beauv.
Festuca rubra (aggr.).
Senecio vulgaris L.
Taraxacum officinale Weber.
T. obliquum Dahlst.
Carex arenaria.

The above plants are the first to appear; further from the littoral zone they all still persist, with the addition of the following:—

Arenaria serpyllifolia L. var. *macrocarpa* Lloyd.
Cerastium tetandrum Curt.
C. semidecandrum L.
Erodium maritimum L'Hérit.
E. cicutarium var. *glutinosum* Clav.
Eryngium maritimum L.
Valerianella olitoria Poll.
Galium verum L. var. *maritimum* DC.
Polygonum Raii Bab.
Phleum arenarium L.
Aira caryophyllea L.
Bromus hordeaceus var. *leptostachys* Beck.

A single lichen was noted on dead stools of Marram grass, *viz.* *Cladonia fimbriata* Fr. f. *exilis* (Ach.).

III. *The Marram with Bracken Association.*—In the lower part of the main depression, *Pteris aquilina* begins to appear amongst the Marram grass, and soon forms a well-marked zone, sharing the ground with the grass, and in places becoming the dominant species. Here many of the plants mentioned in the preceding group continue to flourish. Lichens and mosses carpet the ground in profusion, thriving where the sand is enriched in humus by the decay of the more luxuriant vegetation. *Cladonia alcicornis* forms light-coloured patches, and together with other

Cladoniæ is much more abundant than on the Lancashire dunes. The species noted were as follows:—

Pteris aquilina L., dominant.
Ammophila arenaria Link ,,
Brassica monensis Huds. (rare).
Viola ericetorum Schrad.
Arenaria Lloydii Jord.
Cerastium tetrandum Curt.
C. semidecandrum L.
C. viscosum L.
Polygala oxyptera Reichb.
Erodium cicutarium var. *glutinosum* Clav.
Ononis maritima Dum.
Trifolium dubium Sibth.
Lotus corniculatus L. var. *crassifolius* Pers.
Sedum anglicum Huds.
Galium verum L.
Valerianella olitoria Poll.
Bellis perennis L.
Taraxacum officinale Weber.
Matricaria inodora L.
Jasione montana L.
Calystegia Soldanella Br.
Myosotis collina Hoffm.
Thymus Serpyllum L.
Plantago Coronopus L.
P. lanceolata L.
Carex arenaria L.
Aira caryophyllea L.
A. præcox L.
Anthoxanthum odoratum L.
Agrostis alba L.
Festuca ovina L.
F. rubra (aggr.).
Bromus hordeaceus L.
Botrychium Lunaria Sw.

BRYOPHYTA.

Ceratodon purpureus Brid.
Dicranum scoparium Hedw.
D. scoparium var. *orthophyllum* Brid.
Barbula convoluta Hedw.
B. Hornschuchiana Schultz.
Tortula ruralis Ehrh.
T. ruraliformis Dixon.
Bryum pendulum Schimp.
B. capillare L.
B. roseum Schreb.
Brachythecium albicans B. & S.
Brachythecium velutinum B. & S.
B. purum Dixon.
Camptothecium lutescens B. & S.
Hypnum cupressiforme L.
H. cupressiforme L. var. *tectorum* Brid.
Hylocomium splendens B. & S.
H. splendens var. *gracilius* Boul.
H. squarrosum B. & S.
H. triquetrum B. & S.

LICHENES.

Peltigera canina Hoffm.
Cladonia alcicornis Flöerke.
C. pyxidata Fr. var. *pocillum* Fr.
C. chlorophæa Flk.
C. fimbriata Fr. f. *exilis* (Ach.).
Cladonia fimbriata var. *conista* Nyl.
C. pityrea Flk.
C. furcata Hoffm.
C. pungens Flk.
Bacidia muscorum Mudd.

In addition to the above, the following three lichens were found growing on pieces of weathered old leather lying on the dunes:—

Lecanora Hageni (Ach.).
Buellia phacodes Köerb.
Rinodina exigua Gray f. *demissa* Stiz.

IV. *The Marram with Heather Association.*—As the landward border of the preceding association is reached, the bracken begins to fail, and intermixed with it are a few plants of *Calluna vulgaris*. Further on this becomes more abundant, and is accompanied by a small quantity of *Erica cinerea* and *Rosa spinosissima*. In conjunction with a diminished quantity of Marram grass these plants dominate the rest of the ground. This slopes rapidly upwards, and soon becomes ordinary heathland, characterized here by the occurrence of *Ulex* and *Calluna*. The *Ulex* is the last plant to enter the dune formation, and only appears at about the point where the Marram disappears. In the list of plants of this association given below, those only are tabulated which occur on what may be termed the dune-heath, *viz.* that portion in which the ericetal species are accompanied by *Ammophila arenaria*. Where the Marram disappears and furze becomes a common associate of the heather, which occurs as the sand thins out over the boulder clay, the flora belongs to a different formation. Time did not allow of a careful examination of this heathy tract, which has no equivalent on the Lancashire coast, where the sand-hills gradually merge into dune-pasture and cultivated ground.

The following species, all noted within the range of the Marram grass, belong to this association:—

Calluna vulgaris, dominant.
Pteris aquilina, ,,
Ammophila arenaria, ,,
Rosa spinosissima, subdominant.
Erica cinerea, ,,
Ranunculus bulbosus L.
Erophila verna E. Meyer.
Viola ericetorum Schrad.
Polygala oxyptera Reichb.
P. serpyllacea Weihe.
Cerastium viscosum L.
C. vulgatum L.
Geranium molle L.
Ononis repens L.
Medicago lupulina L.
Trifolium repens L.
Lotus corniculatus L.
Vicia angustifolia L.
Conopodium denudatum Koch.
Anthriscus vulgaris Bernh.
Bellis perennis L.
Senecio Jacobæa L.
S. sylvaticus L.
Arctium (*minus* Bernh.?).
Centaurea nigra L.
Leontodon autumnalis L.
Campanula rotundifolia L.
Lycopsis arvensis L.
Veronica officinalis L.
Euphrasia curta Wettst.
Thymus Serpyllum L.
Plantago lanceolata L.
Rumex crispus L.
R. Acetosella L.
Luzula multiflora DC.
Anthoxanthum odoratum L.
Aira caryophyllea L.
A. præcox L.
Cynosurus cristatus L.
Dactylis glomerata L.
Lolium perenne L.
Festuca ovina L.

Bryophyta.

Polytrichum juniperinum Willd.
Campylopus fragilis B. & S.
Dicranum scoparium Hedw.
D. scoparium var. *orthophyllum* Brid.
Ceratodon purpureus Brid.
Tortula ruralis Ehrh.
Funaria hygrometrica Sibth.
Webera nutans Hedw.
Bryum inclinatum Bland.
Climacium dendroides var. *depauperatum* Boul.
Brachythecium purum Dixon.
Hypnum Schreberi Willd.
H. cupressiforme L.
H. cupressiforme var. *ericetorum* B. & S.
Hylocomium squarrosum B. & S.
H. triquetrum B. & S.
Ptilidium ciliare Hampe.
Frullania Tamarisci Dum.

LICHENES.

Peltigera canina Hoffm.
P. rufescens Hoffm.
P. physodes Ach.
Cetraria aculeata Fr.
Cladonia pyxidata Fr.
C. pyxidata var. *pocillum* Fr.
C. chlorophæa Flk.
C. fimbriata Fr. f. *exilis* (Ach.).
C. fimbriata var. *tubæformis* Fr.
Cladonia fimbriata var. *conista* Nyl.
C. gracilis Hoffm.
C. furcata Hoffm.
C. furcata var. *corymbosa* Nyl.
C. pungens Nyl.
Cladina sylvatica Nyl.
C. uncialis Nyl.
Bilimbia ligniaria Massal.
Lecidea uliginosa Ach.

THE ORIGIN OF SPECIES.

[The following is an abstract of a paper on "The Origin of Species by Crossing" read at a meeting of the Linnean Society on the 19th of February, by Dr. J. P. Lotsy, of Haarlem. The paper was illustrated by diagrams, lantern-slides, and dried specimens.]

We have in all questions of evolution to gather our facts from individuals, because species as well as varieties are abstractions, not realities. Nobody is able to show you a species or a variety; all he can do is to show you one or more individuals which he believes to belong to the species or variety under discussion.

Of *individuals* we know two kinds: homozygotes and heterozygotes. The first are stable; the latter segregate, earlier or later, into new homozygotes. The offspring of a homozygote is identical with its parent, with the exception of mere temporary non-transmittable modifications. If this be true, selection in the progeny of a definite homozygote can have no effect. That it has no effect has been proved by Johannsen. A homozygote consequently is absolutely stable and produces offspring which is genetically identical with it. Yet not all homozygotes are the same, there are many different kinds of homozygotes: homozygote beans, homozygote Antirrhinums, &c.

All these different kinds of homozygotes we may call with Johannsen genotypes, because they differ in genetical constitution, and we can then say that the world is populated—with the exception of heterozygotes—by a large number of sharply-defined absolutely stable genotypes. Under such conditions evolution may well seem impossible; fortunately, the behaviour of the heterozygotes shows us that it is quite possible.

A careful study of the descendants of a heterozygote shows us that it segregates in the next or later generations in a number of individuals, part of which are heterozygous, but part of which are homozygous, and that these homozygotes belong to different genotypes.

A heterozygote consequently gives birth to a smaller or larger number of different genotypes.

By carefully watching therefore a heterozygous individual we *see* the origin of genotypes.

The next step is thus to produce at will these genotypes—originating heterozygotes. This we can do by crossing two individuals belonging to different genotypes.

The next question is: Do all heterozygotes obtained by crossing segregate and thus give rise to different genotypes?

Until very recently it was believed that only heterozygotes obtained by crossing so-called varieties did segregate, while crosses between so-called species were said to give a stable offspring. Evidence is rapidly accumulating that this is not true as far as the latter is concerned, that species-hybrids also segregate.

I therefore claim that the origin of genotypes by crossing is of much wider application than was formerly supposed, that perhaps it is of universal application. I further claim that the genotypes are the real, long sought-for units of the natural system, and I propose that in future the term species be limited to them, in accordance with the view held by systematists for ages that "species" is the proper term for the units of the natural system.

[The question of Progressive Mutations, based upon Prof. H. de Vries's work upon *Œnothera Lamarckiana*, was then discussed.]

The chief question is whether *Œ. Lamarckiana* is a pure genotype, because only if the purity of type is beyond any possibility of doubt is there good reason to explain the throwing of deviating types as due to new formation of factors; in any other case these can be explained as the result of new combinations of factors already present in the plant throwing them. Heribert Nilsson has, in the opinion of the speaker, undoubtedly shown that *Œ. Lamarckiana* is no pure genotype, and consequently cannot serve as a reliable basis for the study of the origin of mutants. Nor did the speaker know of any other case in which progressive mutation from a pure genotype has been proved.

[Mutation by loss of Factors was next considered. It was submitted that but one thing is proved, *viz.*; that the real units of the living kingdom are genotypes; that such genotypes can, under proper precautions, be kept pure for an indefinite time; and that there is no certain evidence that they can be changed in any other way than by crossing.]

What then is *the reason of the apparent variability of a species in the Linnean sense*? In the first place, the fact is that a Linnean species is a *collection* of independent stable Jordanian species. Indeed, as Bateson says; "Between Jordan with his 200 odd species for *Erophila* and Grenier and Godron with one, there is no hesitation possible: Jordan's view . . . . is at least a view of natural facts, whereas the collective species is a mere abstraction." The Linnean species, indeed, has been a snare, and if we, as Darwin did, consider it as a unit, the small species contained in it must naturally appear to be deviations of the type—in other words, varieties. If, then, one further sees that between Linnean species which one considers to be units, transitional forms exist, it is perfectly logical to build up a theory that one species can change to another by means of its variability. Besides, the illusion of variability is not created by the presence of these small species alone. As Bateson says: "When this variability is sorted out, and is seen to be in part a result of hybridization, in part a consequence of the persistence of hybrids by parthenogenetic reproduction, a polymorphism due to the continued presence of individuals representing various combinations of Mendelian allelomorphs, partly also the transient effect of alteration in external circumstances, we see how cautious we must be in drawing inferences as to the indefiniteness of specific limits from a bare knowledge that intermediates exist." The author expressed his firm conviction, as explained before, that no transmittable variation exists, and that all apparent variability is due to an original cross.

Finally, the author proceeded to the origin of species before sexual reproduction took place. He laid stress on the fact that this of course is mere speculation.

As such he offered the following points:—

(1) If a species is a perfectly stable genotype, reproducing faithfully its kind for ever, unless crossing interferes, all differences between the individuals belonging to a genotype must be non-inheritable modifications.

(2) Inheritable variability does not exist, with the always possible exception of mutation through loss of factors. All that has been described as variability is the result of vegetative or generative segregation of heterozygotes.

(3) No inheritance of acquired characters occurs. The total of the inheritable factors now found among higher organisms must have been present in the total of the "urorganisms," each of which, however, possessed but a small number.

[At the meeting of the same Society on June 4, the Rev. George Henslow gave an address on "Darwin's Alternative Explanation of the Origin of Species, *without* the Means of Natural Selection," of which the following abstract was supplied.]

The *cause* of variation, always "changed conditions of Life," with "Definite *or* Indefinite Results" (*Variation, &c.* vol. ii. p. 272, 1868).

Natural Selection is *not* a cause: *e. g.* Mivart (*Origin, &c.* 6th ed. ch. vii.). Also, F. W. Hutton, who says:—"Having Natural Selection to be a *true cause*, and one that largely explained the Origin of Species from Varieties, by *causing* a gradual divergence of character, &c." (*Darwinism and Lamarckism*, p. 38, 1899).

No necessity for the words "several generations" for giving rise to a variation, as plants *vary at once*; but they *are* required for fixing them so as to be heredity under any conditions. "Species" and "Variety" are terms representing the varying amounts of change necessary for adaptation. Hence there need be no intermediate forms.

First reference to "definite action," &c., as a *cause* (*Origin, &c.*

1st ed. End of Introduction, 1859). His original view (*Origin, &c.* pp. 11, 12) not strongly emphasized until 1868 (*Variation, &c.*, and *Origin, &c.* 6th ed. 1878). Reason for delay given to Wagner (*Life, &c.* vol. iii. p. 158; Oct. 1876), viz:—"I could find little evidence of the direct action of the environment."

"Definite variation" leads to "permanent modification of structure," *i.e.* inheritance of acquired characters (*Origin, &c.* 6th ed. p. 421, 1878). These may become only *relatively*, or even *absolutely*, stable under all conditions of life.

Indefinite variations, *also caused* by "direct action of changed conditions of life." They consist of a supposed mixture of individuals, the *minority* possessing "favourable" (*i. e.* adaptive), the *majority*, "injurious" (*i.e.* inadaptive) variations. Such is the *Theory of Natural Selection* as described (*Origin, &c.* 6th ed. p. 63, 1878).

Natural Selection is *not* required, for the majority die by "fortuitous destruction" (*Origin, &c.* 6th ed. pp. 53, 54, 59–89), *e.g.* Sir E. Ray Lankester says, one out of a million eggs of an oyster may survive, *i. e.* per *chance* (Darwin's word).

Contra, F. Buckland says of young oysters, transferred to new localities, that within two months they begin to assume the "native characters" (*Variation, &c.* vol. ii. pp. 280, 281).

In illustration, Mr. Henslow adduced the following examples:—

Mesophytic plants becoming aquatic and *vice versâ*, e. g. Water Crowfoot. *E.g.* Monocotyledons originated from aquatic Dicotyledons. Mesophytic plants becoming Xerophytic and *vice versâ* by means of water, *e.g.* Restharrow, &c. Cultivated plants originating, by prepared soil, from wild plants, and their reversion, *e.g.* root crops. Depauperised and dwarfed plants, recognized as specific; through drought, submergence, parasitism, and saprophytism.

Darwin's final charge against scientists for their misrepresentations:—"Great is the power of steady misrepresentation; but the history of science shows that, fortunately, this power does not long endure" (*Origin, &c.* 6th ed. p. 421). It has lasted for fifty-five years (1859–1914).

NOTES ON DR. FOCKE'S *RUBI EUROPÆI* (1914).*

By the Rev. W. Moyle Rogers, F.L.S.

Rubi Europæi is the latest product of Dr. Focke's unrivalled work on the brambles of the world, and of Europe in particular. Here we find in great detail his maturest views on our British Rubi in correlation with those known on the continent of Europe. We can hardly be too grateful to him for the untiring labour evident throughout. Some criticism of the conclusions reached is, however, inevitable. And naturally those whose opportunities of study have been more concentrated through a long series of years on the forms occurring in any one country, or group of neighbouring countries, may still doubt whether the last word has been said in every case. As will be seen by anyone turning over the pages (in the earlier groups especially), Dr. Focke finally assents to most of our names, though he often groups them differently, as was to be expected in so elaborate a classification as that now formulated by him. To this difference of grouping only occasional reference will be found in the following notes. The few illustrations from photographs which occur here and there—however unsatisfying in some respects, as they must always be—are yet of real value as reproducing exactly both leaves and detailed outline of flowering branches.

---

* *Bibliotheca Botanica.* Herausgegeben von Prof. Dr. Chr. Luerssen Danzig-Zoppot. Heft 83. Wilhelm Olbers Focke: Species Ruborum. Monographiæ generis Rubi Prodromus. Pars iii. Stuttgart. 1914.

The first three groups of the *Fruticosi* section of *Rubus* in our *London Catalogue*, ed. x. (*Suberecti*, *Subrhamnifolii*, and *Rhamnifolii*) contain twenty-four numbered "species." Of these, four (*castrensis*, *incurvatus*, *durescens*, and *lacustris*) are, so far as is at present known, endemic in Britain, and so necessarily retain our names in *Rubi Europæi*; as do eighteen out of the remaining twenty, leaving only two of the twenty-four—*R. integribasis* and *R. Lindleianus*—in doubt. Of these, *R. integribasis* must now apparently be either struck out of our list, or provisionally, as a matter of convenience for reference, changed from "*R. integribasis* P. J. Müll.?" (as it now stands) to *R. integribasis* Rogers (*non* P. J. M.); as Dr. Focke, who first suggested the name for our plant, has, after considerable previous hesitation, distinctly disallowed it. He says of it: "In plantâ Britannicâ (*R. integribasis* Rogers) foliola potius obovata, aculei paullo longiores et robustiores sunt. Stamina stylos superant. Petala roseola. *R. cæresiensi* [Sudre et Gravet] sine dubio magis affinis quam *R. integribasi*." And he adds, "Im südlichen England." Our plant, as thus distinguished, is locally abundant throughout South-east Dorset and along the New Forest border in South Hants, extending in that direction to Woolmer Forest, North Hants. I have also seen it on Tooting Common, Surrey. It must therefore have a permanent place in our list, and ultimately a new name.

In the case of *R. Lindleianus*, Dr. Focke now writes: "*R. vulgarem* et *R. Lindleyanum* olim (Syn. Rub. Germ.) distinguere conatus sum, sed revera omnino confluunt et limites naturales non existunt." Whether in consequence of this we should change our name is no doubt a question for decision; as to which, I must own, I feel no little difficulty. Lees's *Lindleianus* is one of our most widely distributed and strongly marked British brambles, with which I have long been very familiar. Of the German *R. Lindleyanus* (Syn. R. G. and Aschers et Graebn. Syn. Mitt. Fl.) I have seen no specimens; but I have six sheets of "*R. vulgaris* Wh. & N.", collected by Dr. Focke at Minden (1871 and 1873), Rinteln (German. boreal.) 1872, and Bremen

1889, and I could not put these together as one species; nor does any single sheet seem to me identical with our plant, though the two Minden sheets are near it. The figure of *R. vulgaris* (tab. xiv. p. 38) in Rub. Germ. is also considerably unlike our *R. Lindleianus.* So I am still unwilling to surrender our name for Weihe & Nees' more aggregate one.

As to *R. Rogersii* Linton, there is happily no longer room for uncertainty. It is now accepted by Dr. Focke as a good "species," and as (so far as is yet known) endemic in the British Isles, while his *R. ammobius* takes subordinate rank after it, as "*R. plicato* et *R. Rogersii* similis." In further differentiation of the German plant he adds, "foliola multo majora quam in *R. Rogersii*, vix plicata; terminale in foliis quinatis cordato-suborbiculare vel cordato-ovatum; infima breviter petiolulata. Rami fertiles, petioli pedunculique multo parcius aculeati quam in *R. Rogersii.* Flores majores quam in *R. plicato* et *R. Rogersii.* Petala incurva, *i.e.* e fundo patente ascendentia." Though thus distinct enough from our plant, it is obviously allied to it.

The above notes refer only to numbered "species" in our first three groups. In addition to such species, we have eight well-marked forms in these groups. In the *London Catalogue* these are all entered as varieties, the plan of the *Catalogue* being to class all the plants admitted into it as either species or varieties. But it must not therefore be taken for granted that all these "varieties" (either here or elsewhere) are necessarily of equal value, *i.e.* as conspicuously distinct all from the species with which they are placed. I have never thought them so certainly, as I tried to show by dividing them into "sub-species" and "varieties" in my *Handbook of British Rubi.* These more or less subordinate forms are not always easily traced in *Rubi Europæi.* This is partly due to the author's comparatively slight acquaintance with some of them, only a few having been seen by him when he visited England in 1889 and 1894; while he has not always been kept duly supplied with dried specimens. Of those in our first three groups, however, *Briggsianus* is the only one which he seems not to have noticed. As to the rest, he suggests no important change or rearrangement, except in the case of *Bertramii*, which, apparently, he no longer accepts as British, though I can find no discrepancies between his fuller description and my short one in my *Handbook of British Rubi*, p. 22, nor between our plant and "Slesvig" specimens received from Mr. Friderichsen. His *R. opacus*, however (a variety of *R. nitidus* in the *London Catalogue*, but a sub-species in my *Handbook*), he places as an independent but unnumbered form or species after his *R. ammobius*, with the note added: "*R. nitidus* subsp. *opacus* Rogers *Handbook of British Rubi*, p. 23, ex meâ sententiâ non differt, quamvis *R. opacus R. plicato* magis affinis videtur quam *R. nitido.*"

Thus far I have written as if our grouping fairly corresponded with that adopted in *Rubi Europæi.* But, as I have stated above, it does so only partially, even while we are considering the earlier species, as in the above notes. Dr. Focke's arrangement, as now elaborated by him for the *Rubi of the World*, is really much more complicated than ours, and, as we advance beyond our first three groups, a detailed comparison between the two systems, and the attempt to keep a corresponding order in dealing with the plants, becomes increasingly difficult. From this point, therefore, I may content myself with briefer notes bearing almost exclusively on details connected with the specific and varietal names.

Thus the *Villicaules*—a small intermediate group with us—is now divided by Dr. Focke between his more aggregate *Rhamnifolii* and *Silvatici*, and nothing need be here added to what may be found on its species and varieties in the 1905 volume of this Journal, p. 201. As regards our *Discolores* also, his treatment now is not materially changed from that found in his Aschers. et Graebn. Syn. Mitteleur. Fl., pp. 499–512, and is hardly such as to call for special comment here. When we come to *Silvatici* and *Vestiti* it is otherwise; and changes are suggested of special interest to us.

Our *R. hesperius* is no longer associated by Dr. Focke with his *R. myricæ*, but is placed by him in an independent position, as a numbered species, between *R. Sprengelii* and *R. Arrhenii*; while *R. myricæ* is removed to a place among the *Egregii*, with the following explanation: "Prima, quæ vidi, specimina comparavi cum *R. myricæ* meo (*vide* Rogers, *Handbook*, l. c.), sed, plantis iterum atque iterum examinatis, differentiæ nunc graviores mihi apparent. *R. myricæ* ex affinitate *R. Silvatici* removi." So *R. myricæ* disappears from our list. I may add that though *R. hesperius*, exactly as described in the 1896 volume of this Journal, has so far been found only in Ireland, a very closely allied form, which need not perhaps claim a separate name, occurs near Bangor (Carnarvon) and in three or four English counties. It is unknown on the Continent, and Dr. Focke expressly separates from it the "*R. hesperius*, Piper, Erythrea v. p. 103," published two years later than the Irish plant.

R. Colemanni Blox. Dr. Focke now places this between *R. villicaulis* and *R. Selmeri*; but our position—last among *Silvatici* and close to *Vestiti*—seems preferable. He also says of it: "Verosimile mihi videtur *R. Colemanni* auctorum recentiorum 'speciem' aggregatam esse. Plantæ *Bloxamii* typicæ originem hybridam (*villicaulis* × *radula*?) suspicor." Such an opinion should not be lightly brushed aside. But opportunities of studying the living plant have greatly multiplied in recent years, and it proves to be very widely spread in England, east and west, from Yorkshire to Hants. It is also locally abundant, and, as a rule, quite remarkably constant. Bloxam's dried specimens of his Leicestershire plant have shorter and usually more roundish leaflets than I have seen from any other county; but I cannot see that they are otherwise different.

R. orthoclados Ley. In Aschers. et Gr. Syn. vi. 470 (1902) a new name (*R. euchloos* Focke) was substituted for Ley's name, a change not welcomed by Mr. Linton and me in our paper in the

1905 vol. of this Journal, p. 201. Ley's name is now restored for the British plant, and *R. euchloos* separated from it and transferred to M. Gravet's Belgian plant, referred to on p. 47 of my *Handbook*. But a further suggestion is now made that both are probably of hybrid origin: the British as "*plicatus* × *Sprengelii*," and the Belgian as "? *suberectus* × *Sprengelii*." Of the latter I have seen only dried specimens, which in this instance are not sufficient for distinction, as Dr. Focke points out. Mr. Ley took Dr. Focke and me in 1894 to see his plant on the Beacon Hill, near Trelleck, Monmouthshire, where it "occupies a large area of woodland (some three square miles)," and his article describing the plant (Journ. Bot. 1896, 159, 160) contains the following remarks bearing on the question of a possible hybrid origin: "On the adjoining heath occurs what seems to be a form of the same bramble with leaves much more deeply cut and plicate, and with the glands of the panicle-rachis fewer and subsessile. A hybrid also occurs on the heath between the last-named plant and (probably) *R. Sprengelii* W." Some of the specimens in my herbarium represent this hybrid, and others varying examples of *R. orthoclados*—all tending to confirm Dr. Focke's present view. In our future lists, therefore, it may perhaps be sufficient to give Ley's plant as a hybrid—*Sprengelii* × ? *plicatus*. I have seen specimens of very similar plants from several of our western counties, from Cheshire to W. Gloucester. The *R. orthocladus* Boul. Ronc. Vosg. 127 (1869) is now "suspected" by Dr. Focke to be *R. foliosus* × *macrophyllus*; but apparently the same plant had in 1861 been named *R. anoplostachys* by Mueller, its discoverer, and so could have no right to Boulay's name in 1869 (Journ. Bot. 1905, 201).

Next to *R. orthoclados* in *Rubi Europæi* comes "*R. rubricolor* Blox. in Syme Engl. Bot. ed. 3, iii. p. 180, *teste* J. E. Griffith," without further description than the following: "Frutices humiles, inter se variabiles, sed omnes *R. nitido* similes et crebre vel parcius glandulosi. Flores rosei. V. v. sp. Bei Bethesda in N. Wales." But I believe it to be impossible to separate Bloxam's plant (now for many years shut out of our list) from the very aggregate *R. lentiginosus* Lees, which is common and variable in the Bethesda neighbourhood.

(To be concluded)

PROTECTION OF THE CAPE FLORA.

The Selborne Magazine for April contains an interesting account of the steps taken for the protection of the Cape Flora, from the pen of Mr. A. Handel Hamer, Vice-President of the Mountain Club of South Africa. The gradual destruction of the more attractive plants of Table Mountain and other habitats near centres of population had proceeded for some time. At last "public opinion grew strong on the matter, and in 1905 the Cape Government passed an Act under which regulations could be issued forbidding the sale of certain species, and instituting close-times during which certain species might not be plucked. This legislation, however, had very little, if any, effect, owing to the fact that its administration was left to the police. In 1910 the Mountain Club of South Africa began to take up the matter afresh, and for this purpose one of the effects of the establishment of the Union Government of South Africa was fortunate, inasmuch as the protection of the fauna and flora was given over to the Provincial Councils, which were established for each Province, as the late separate Colonies now became. An influential deputation was arranged, and waited upon the Administrator of the Cape Province (Sir Frederic de Waal) to urge the necessity of further steps being taken. The representations of this deputation were well received by Sir Frederic, who has thrown himself actively into the work of constructing the necessary Provincial legislation in all directions. As a result, about twelve months afterwards, new regulations were got out, greatly enlarging the scope of the former ones, and absolutely forbidding the plucking of a large number of species by anybody for a period of three years. At the same time a Wild Flowers Protection Committee was formed by the Mountain Club, who invited delegates from the National Society, the Royal Society of South Africa, the South Africa Museum, the South African College, The Publicity Association, and the City Council. From this large committee a vigilance committee was picked of members who were determined to see the regulations administered.

"The immediate result was to demonstrate the absolute uselessness of the Cape Government's Act under which the new regulations were issued. As soon as prosecutions were instituted it was found that they could rarely be successful, because it was necessary to prove that the flowers had been plucked on Crown lands, and there was no means of compelling the accused to say where he had got the flower from. Moreover, according to the preamble of this Act, the species was required to be in danger of extinction." A new ordinance was therefore obtained, of which the practical legislative points are as follows:—"The onus of proof is placed upon the accused that he obtained a prohibited flower in a legitimate manner. Such a legitimate possession could only occur if he were the owner or had the written permission of the owner of the land from which it had been obtained, or if it had been cultivated in land set apart for the cultivation of flowers. The selling of blooms, or any other parts of specified plants, by anybody whatsoever (owner of the land on which they grew not excepted) can be prohibited by the regulations, excepting only flowers cultivated on land set apart for the purpose. Provision is made by which the Commissioner of Police can issue authority to suitable persons, by virtue of which written authorities or warrants the holders can require the name and place of abode of any person reasonably suspected of transgressing the regulations. If the required information be refused an additional fine is provided for if the offender be eventually brought to book. These warrant-holders have formed themselves into a special committee, and have drawn up a constitution with a view to keeping themselves up to the mark and providing *inter alia* that they should meet periodically to compare notes, and that no names should be handed to the police for prosecution until the cases had been submitted to the committee or a sub-committee appointed to supervise prosecutions. The reason for this latter provision is, of course, to avoid the possibility of the movement being injured by hasty or mistaken prosecutions."

SHORT NOTES.

Rosa sinica.—*Rosa sinica* is often cited as of Ait. Hort. Kew. (ed. 2, iii. 261)—*e.g.* by Lindley, *Rosarum Monographia* (1820), Hemsley in *Index Fl. Sinensis*, i. 250, Hook. f. in Fl. Brit. Ind. ii. 364—to designate a species distinct from *R. sinica* L. Syst. Veg. ed. 13, 394 (1774), a plant with subglobose glabrous receptacle. Aiton in his first edition (Hort. Kew. ii. 203 (1789)) merely copies Linnæus's diagnosis; the reference in the second edition is a repetition of the first. *R. sinica* Ait. is therefore identical with *R. sinica* L. Aiton adds "cult. 1759 by Mr. Philip Miller." Miller makes no reference to this species in his *Dictionary*, and there is no specimen from him in the Banksian Herbarium. Robert Brown in his MSS. writes: "said to be cultivated in 1759 by Mr. Philip Miller, and as there is no reference to his *Dictionary*, it must be inserted from the memory of Mr. Aiton, the elder." *R. sinica* as a synonym or closely allied species of *R. lævigata* starts with Lindley, whose description is based on a specimen from Bladh in Herb. Bank. whose figure is copied from a Chinese drawing in the same collection. *R. sinica* L. is probably the same as *R. indica* L., see Lindley, *op. cit.*—W. Fawcett.

Lecanora isidioides Nyl. in the New Forest.—This extremely rare and local lichen, which has hitherto been recorded in Great Britain from a small area in North Wales only, was found quite recently (April, 1914), growing in a part of the New Forest, near the hamlet of Cadnam. It is on the mossy trunk of an oak tree, southern aspect, and extends in more or less isolated patches from one to eight feet above the ground. The plant is in a very healthy and vigorous condition, both in the development of the thallus and in the production of apothecia. Crombie says (*Monograph of Lichens found in Great Britain*, part i., 1894):—"The thallus is rather scattered, greenish grey when moistened, usually but sparingly fertile, though in one corticolous fragment the apothecia are somewhat numerous." The New Forest specimens are abundantly fertile, so much so that the apothecia are in some cases slightly angular owing to close contact. The fruits are also, on the average, slightly larger than those of the Salwey and Borrer specimens in the herbarium of the British Museum, but this may possibly be due to the age of the specimens. The diameter of the larger apothecia of the New Forest specimens is just over 2 mm. The spores are all slightly constricted, and the mature ones are decidedly brown; they vary much in size, the largest being 0·03 mm. long and 0·015 mm. broad. The Salwey specimens are dated Cwm Buchen, 1835, and one of Borrer's, 1841. Crombie remarks, in the monograph already referred to, that *Lecanora isidioides* has not recently been met with, and there is no record from anywhere in Great Britain since the date of the book.—Robert Paulsen.

Puccinia Smyrnii.—This fungus, parasitic on *Smyrnium Olusatrum*, is recorded by Plowright as occurring, "Æcidiospores, May to June; teleutospores, June to July," and by Grove, in his book, as "Æcidia, April–June; teleutospores, June–August." It is perhaps, therefore, worthy of record to state that through the kindness of Miss D. E. Gepp I have received consignments of the fungus from Torquay each month from August to April. In every case æcidia and teleutosori were present, the former always much the more abundant. In December, January, and February the teleutosori were very few in number and indifferently hypophyllous or epiphyllous. The teleutospores germinate overnight in hanging-drop, giving rise to a typical promycelium, the sporidia produced often having germinated *in situ* by the morning.—J. Ramsbottom.

Isle of Man Hepaticæ (p. 45).—Prof. Farmer states that "little or nothing has yet been done towards recording the species that occur in the Island." As an official of the Moss Exchange Club I should like to call attention to the second edition of the *Census Catalogue of British Hepaticæ*, issued in May, 1913, where all the species mentioned by Prof. Farmer are recorded, except *Eucalyx subellipticus* (hitherto only noted for Mid-Perth), *Lejeunia cavifolia* var. *planiuscula* and *Anthoceros lævis*. The list given in the *Catalogue* is a rich one, based on work done by Mr. G. A. Holt, with supplementary records supplied by Mr. Beesley and others. I understand that Mr. Hunter has recently made further additions of interest. Altogether about eighty species and varieties are known to occur in the Island. Of the genera referred to by Prof. Farmer there are recorded three species of *Lepidozia*, seven species of *Lophozia*, and one species each of *Fossombronia*, *Madotheca*, and *Radula*.—J. A. Wheldon.

REVIEWS.

Flowering Plants of the Riviera: a Descriptive Account of 1800 of the more Interesting Species. By H. Stuart Thompson, F.L.S. With an Introduction on Riviera Vegetation by A. G. Tansley, M.A. 24 coloured plates (112 figures), after water-colour drawings, by Clarence Bicknell, and reproductions of 16 photographs of vegetation by the author. Pp. xxviii, 249. 8vo, cloth. 10*s*. 6*d*. net. Longmans, Green and Co.

There was certainly room for a portable book descriptive of the numerous flowering plants to be found on the French and

Italian Riviera, and Mr. Stuart Thompson has succeeded in supplying it. For this he is especially well qualified, for besides a good general acquaintance with European plants, he has acquired a special knowledge of the plants of the region, more particularly of the Department of the Var, which has an especially rich flora—2140 species of phanerogams alone being recorded for it. His previous volumes on alpine and sub-alpine plants have moreover already shown his competence for the task.

The book is wisely planned so as to include within its covers all that is needed to render the descriptions intelligible to the intelligent amateur. There is a chapter on collecting and preserving plants, a glossary of botanical terms, and a synopsis of families. Mr. Tansley's general introductory essay, although comprised within nine pages, is a clear and readable account of the general features of the vegetation, which are also presented by the excellent reproductions of Mr. Thompson's photographs. Keys to the genera are given under each order; the descriptions of the species should present no difficulties to those who are accustomed to work with a British flora, and indeed can without difficulty be mastered by those who attempt the work of discrimination for the first time. They will be aided in their work by the coloured figures, much reduced from the admirable drawings of Mr. Clarence Bicknell, who has generously allowed the author to make use of these. Their insertion may be justified on the principle that half a loaf, or even a smaller portion, is better than no bread; but those who know Mr. Bicknell's volume, published in 1885, on the *Flowering Plants and Ferns of the Riviera*, will share with us the hope that more of his drawings may be reproduced in a style worthy of the originals. Mr. Thompson in his preface usefully summarizes the literature which has already appeared on the plants of the region; and acknowledges the help he has received from various botanists—a curious sentence towards the end of the penultimate paragraph needs revision. "The nomenclature does not follow rigidly the Vienna Rules of 1905; and in some cases a well-known name is purposely left, even though it may not be the earliest." We are glad that Mr. Thompson has not felt it necessary to coin what are called "English names."

It remains to be said that the book is admirably printed on thin but opaque paper, is suitably bound and is light in the hand. We anticipate for it a large sale.

Genera of British Plants, arranged according to Engler's 'Syllabus der Pflanzenfamilien' (Seventh edition, 1912), with the addition of the Characters of the Genera. By HUMPHREY G. CARTER, M.B., Ch.B. Pp. xviii. + 121. Price 4*s.* net. Cambridge: at the University Press.

ARRANGED according to any reasonable system of classification, a book with such a subject should prove a welcome addition to the literature of British botany. So much attention is paid nowadays—too often vainly, it must be said—to hair's-breadth distinctions between "sub-species," "varieties," "sub-varieties," "forms," and so forth, that this compact little volume dealing with the British flora from a wider outlook comes as a wholesome change. It should be not only a help to the beginner who does not know his genera, but a healthy reminder to the expert species-monger who forgets their existence.

The merits of Engler's system appeal most strongly, perhaps, to the systematist whose practical experience has been confined to the flora of the north temperate regions in the eastern hemisphere. The general practical systematist, whose daily business it is to deal with tropical plants as well, embracing every genus of every natural order, may regard the older British system of Bentham and Hooker with more favourable eye. Nevertheless, if Engler's system is all that Mr. Carter claims it to be in his preface, he has increased the debt that British botanists will owe him for his lucid exposition of the genera native in their country, by referring them to "the nearest approach to a natural system that we possess."

The modification of the nomenclature in Pteridophyta, made to "secure uniformity in the terminations of the names of orders," might have been extended beyond that group, or omitted altogether.

Bower's classification of the Ferns, and Warming's arrangement of the Urticales, are the only departures from Engler's system adopted; and these seem desirable in both cases.

The book is well printed, and the type differentiated with judgment. The size is not inconvenient, but the volume might have been more pocketable, even at the cost of a little greater thickness. The price, too, is rather high, even for an introduction to Engler's system, when Hayward's *Pocket-book* can be bought for another sixpence.

H. F. Wernham.

Transactions of the British Mycological Society for 1913. (Vol. iv. part 2; published May 28, 1914.) Worcester: Baylis & Son. Price 10*s*. 6*d*.

The increased activity amongst mycologists in this country is indicated by the *Transactions of the British Mycological Society* for the season 1913. The number before us contains two hundred and twenty-seven pages, and is greater in size than either of the first two volumes, which each occupied five years. There is also a great increase in the number of active members, and there can be no doubt that the Society is flourishing in every way, and fulfilling all the functions that such a society can. The informal spring foray held at Dolgelley is reported, and a list of the fungi and mycetozoa found there is given. The autumn foray at Haslemere is described at length, and the fungi found there are listed; Mr. Carleton Rea is responsible for these accounts. The mycetozoa of the Haslemere foray are recorded by Miss G. Lister, and short notes are added in certain cases. The President for the year, Mr. A. D. Cotton, gave as his address "Some Suggestions as to the Study and Critical Revision of certain Genera of the Agaricaceæ," in which he urged that the monograph was the means by which any real advance would be made, and pointed out various recent ideas on intensive description. Mr. Cotton also has a short paper on the production of impoverished spores by decapitated agarics. Other papers on Basidiomycetes are:—"The Fruit-body Mechanism of *Bolbitius*," by Professor A. H. R. Buller, in which it is shown that this genus stands far apart from *Coprinus*; "Some Notes on the Genera of the Thelephoreæ," showing the origin of the present ideas on the group, by Miss E. M. Wakefield, who also has a note "On the Identity of *Corticium porosum* Berk. et Curt," which is held to be identical with the *C. stramineum* of Bresadola. Mr. F. T. Brooks records his observations on pure cultures of certain Ascomycetes and Basidiomycetes, the lignicolous species dealt with being grown on sterilized blocks of wood. In the Uredineæ, Mr. J. Ramsbottom deals with the nomenclature of some of the species according to the International Rules of Nomenclature. Mr. W. Watson describes as new a Pyrenomycete, *Pleospora hepaticola*. In the Discomycetes, Mr. Ramsbottom gives "Some Notes on the History of the Classification of the Discomycetes," beginning with Theophrastus and ending with the present systems; and "A List of the British species of Discomycetes arranged according to Boudier's System, with a Key to the Genera." The names given in Massee's "Fungus Flora" are appended. Dr. Bayliss Elliott describes, diagnoses, and illustrates a new variety of mould, *Sepedonium mucorinum* Harz var. *botryoides*. New records for this country and new species to science are dealt with by Dr. J. W. Ellis ("New British Fungi"), Miss A. Lorrain Smith and Mr. J. Ramsbottom ("New or Rare Microfungi"), and Mr. Rea ("New and Rare British Fungi"). The last paper is illustrated by three plates, two of which are coloured, and are from drawings by Mrs. Rea. The results obtained by cytologists in the study of the reproductive processes of fungi during the past year are dealt with by Mr. Ramsbottom. It will be seen that all branches of the study receive attention in the *Transactions*, and both the Society and their indefatigable secretary, Mr. Carleton Rea, are to be congratulated on the appearance of a handsome number.

Die Stoffwanderung in ablebendend Blättern. Von Dr. Nicolas Swart. Pp. 1–118, 5 Tafeln. 6 Mark. Jena: Gustav Fischer.

This interesting addition to the literature of vegetable physiology begins with a general introduction of a couple of pages, occupied chiefly with a discussion of previous conclusions, such as those of Ebermayer (1876) concerning the behaviour of various food-materials stored in the leaf in the autumn up to the time of its fall. The opinion of the earlier students of this subject was that the food-materials in question travelled into the stem, or perennating parts, when the deciduous leaves made their preparations for fall. Wehmer's subsequent work (1892) and criticism of this is mentioned, especially in regard to erroneous deductions made from ash-analysis. The rest of the work is divided into three parts. The first (pp. 4–69) deals with the

"Auswanderungslehre" historically, affording a valuable *résumé* of previous researches from Sachs (1863) onwards, and concluding with tabular details of the author's ash-analyses of various plants of widely-differing affinities; the respective weights of the various food-materials in the green leaf, and the yellowing, falling leaf are compared. Part ii. (pp. 70–96) deals with the colour-change induced in the leaf before it falls—namely, from green to yellow. The subject is viewed from many points: the arrangement of the chlorophyll; anatomical changes in the leaf-base; microscopic changes in the chloroplasts; climatic influences; effect of anthocyan upon translocation of food-stuffs. This part concludes with the statement that the yellowing of the leaf is not the result of its gradual dying, but a vital process, the visible effect of various physiological changes. Part iii. (pp. 97–117) is entitled "Schlussbetrachtungen," and deals with the general causes of leaf-fall in evergreen plants and in deciduous trees. Finally, the causes of the loss of food-material from leaves before their fall is discussed. This loss, it would seem, is not due to such a simple process as the mere travelling of the substances into the permanent parts, but is an essential portion of the complicated changes, structural and chemical, inseparable from the phenomenon of leaf-fall. The subject before us is one aspect of the wider familiar proposition that leaf-fall is essentially a process concerned with life, not death. And this process is so complex, the changes presumably so continuous and covering so long a period, that the observations of a single student, taken even with that scrupulous care of which Dr. Swart's work bears the unmistakable impress, must needs be somewhat unconvincing, if only for the practical limits placed upon their frequency during that period. This book of his is, nevertheless, of considerable historical interest, and is written with a lucidity and conciseness not always common in the work of his countrymen. The author's own results are not very considerable, but they should afford a useful indication of the general lines upon which co-operative research might profitably be directed.

H. F. Wernham.

Untersuchungen über die Flechtengonidien. Von Fredr. Elfving. Acta Soc. Sci. Fenn. Helsingfors, 1913. Tom. xliv. No. 2. 71 pp.; 8 plates.

In this publication Herr Elfving has revived the old controversy as to the origin of the green cells or gonidia in the lichen. The dual nature of the thallus has been so long accepted, and has fitted in so exactly with the life conditions of the conjoint organisms, that it gives one a considerable shock to be taken back to the position held by Tulasne, and to find it again seriously maintained that the gonidia are genetically connected with the hyphæ. The author has not tested his theory by cultures—which alone would be decisive—but by examination of the growing areas of the thallus. He claims to have seen the different stages of formation of the gonidia in a number of lichens associated with such different "algæ" as *Cystococcus*, *Trentepohlia*, *Stigonema*, and *Nostoc*. He allows that those gonidia increase by division within the thallus after they have been formed by the hyphæ, and that they also may live a free life in the open as "algæ."

Elfving's view lands us in a series of problems: how are we to account for the origin of other algæ that do not enter into symbiosis with the lichen fungus, but the life-histories of which are entirely comparable with that of gonidia in a free condition, unless, as he seems to hint, the ancestors of those algæ are to be found among lichen gonidia? Again, how explain the twofold reproductive system combined in one plant—the fungal and the algal; each after its kind? It is easier to suppose wrong observations as to the genetic connection of the colourless and the coloured cells, than to accept the conclusion that a homogeneous plant should exactly follow the life-history of two different groups of plants, and of various sections within that group. The author does not attempt to explain these anomalies; he is content to affirm and reaffirm the correctness of his own observations.

A. L. S.

BOOK-NOTES, NEWS, &c.

It has required large type, wide leading, and broad margins to extend to less than a hundred small pages Dr. William Macdonald's reprinted papers on *Makers of Modern Agriculture* (Macmillan). The "makers" are Jethro Tull (1674–1740), Thomas William Coke—"Coke of Norfolk"—(1752–1842), Arthur Young (1741–1820), Sir John Sinclair (1754–1835) and Cyrus H. McCormick (1809–1884)—the last a Virginian, "the inventor of the reaper"—*i.e.* the reaping machine. The sketches betray evidence throughout of their newspaper origin; thus the notice of McCormick begins:—"It is hardly to be expected that those people who devoutly chant in a million churches the fourth sentence of the Lord's Prayer should think with gratitude of any other person than the Divine Giver of all Good. Yet it is strange to reflect that, although every schoolboy knows something of the life of our least Poet Laureate, not one in ten thousand could tell you the career of the man who responded in a truly miraculous manner to the heartfelt, world-voiced matin of both rich and poor, 'Give us this day our daily bread.'" The knowledge which Macaulay ascribed to his schoolboy pales before that which Dr. Macdonald postulates for his. The "subsequent paper," promised on p. 52, does not appear: it was to deal with the writings of Young, of which Dr. Macdonald says: "Our library is far from complete, yet we possess sixty-six volumes of his sparkling prose, which placed one upon another attain a height of nine feet—a monument of amazing industry . . . . He met and conversed with the greatest savants of the age, yet his mind never burst the old wine bottles which he served out in the Sussex store." "Sparkling prose" of this kind adorns the little book throughout, but we cannot help thinking it is dear at half-a-crown net.

The Country Month by Month, in which Mrs. Owen (better known as the editor of "A Son of the Marshes") and Mr. G. S. Boulger combined "to try and give a practical direction to lovers of Nature in their observations by telling them of the sights they may expect to find, month by month, in their country wanderings," has now been reissued in a handsome volume of 500 pages, which is rendered attractive by the addition of twelve coloured plates and twenty illustrations from photographs. The names of the authors are sufficient guarantee that the slipshoddity which still characterizes too many "popular" works is absent from this, and we know of no better book for the dweller in the country who wants to know something about the birds, plants and insects—the first dealt with by Mrs. Owen, the others by Mr. Boulger—which he may meet with on his walks. The book, which costs 6*s*. net, is published by Messrs. Duckworth, who still follow the practice, which we hoped had become obsolete, of disfiguring the titlepages of their "review" copies with an ugly rubber stamp in violet ink.

At the meeting of the Linnean Society on June 18th, a paper by the late Mr. William West, "Ecological Notes, chiefly Cryptogamic," was read in abstract by Dr. Stapf, who remarked that this paper was the outcome of a suggestion by Prof. Engler, that whilst abundance of observations existed of ecological facts regarding phanerogams, the cryptogams had been neglected. This paper, intended as the first of a series, deals chiefly with the corticolous associations of epiphytes. A very large number of observations were detailed, and an approximate percentage estimate of the chief epiphytes was given. *Stereodon cupressiformis* var. *filiformis* is found to be the most prevalent epiphytic moss generally; but in some localities, especially those with a very heavy rainfall, *Isothecium myosuroides* becomes the most abundant, especially on the lower part of the trunks. *Parmelia saxatilis* is the most abundant epiphytic lichen: *P. physodes* sometimes becomes dominant in exposed and wind-swept places. *Lecanora tartarea* and *Platysma glaucum* attain dominance sometimes in places subject to frequent montane storms. *Frullania dilatata* is probably the most frequent epiphyte among the Hepatics, but *Metzgeria furcata* is now and then the most abundant. From the detailed tables given of epiphytes, which only represent portions of the district examined, and are not given as what may be expected in every locality, the percentage comes out:—*Stereodon cupressiformis* 16, *Parmelia saxatilis* 6, *Isothecium myosuroides* 2, *Frullania dilatata* 2, *Parmelia fuliginosa* var. *lætevirens* 2, *Lecanora tartarea* 2, *Platysma glaucum* 1, and various species of *Pertusaria* 1. The observations extend over parts of Scotland, Wales, Ireland, and the Lake District.

The following British botanists will attend the forthcoming meeting of the British Association in Australia:—Prof. F. O. Bower, President of the Botanical Section; Prof. A. C. Seward, Vice-President; Misses M. Benson, E. M. Berridge, L. J. Clarke,

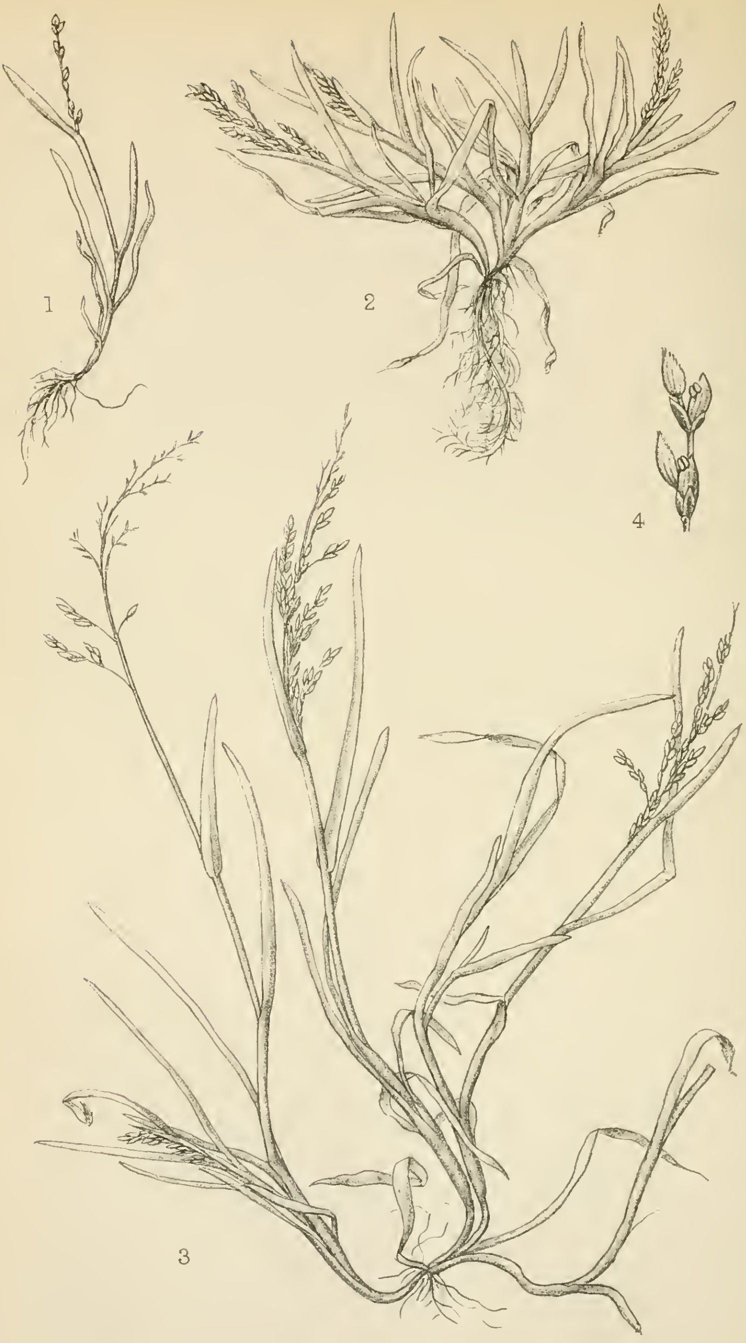
L. S. Gibbs, E. R. Saunders, A. L. Smith, and E. N. Thomas, and Messrs. W. Bateson, R. H. Compton, G. C. Druce, A. H. Evans, H. O. Forbes, R. P. Gregory, W. P. Hiern, T. Johnson, and Dr. A. B. Rendle.

In a paper entitled *Beiträge zur Kenntnis der Pteridophytengattung Phyllitis* (reprinted from Œsterreich. Botan. Zeitschrift. 1914, pp. 19–36, 5 pls. and 2 maps), Friedrich Morton publishes two studies of the genus *Phyllitis* Ludw. (*Scolopendrium* Adans.): (i.) the finding of *P. Hemionitis* (Lag.) O. Kuntze in the Quarnero region, and the distribution of the species; (ii.) the systematic position, distribution, and ecology of *P. hybrida* (Milde) Christensen. Having made a comparative study of this species and its allies in respect of the following structures: (1) the endings of the vascular bundles in the frond-lobes; (2) the position of the sori; (3) the indusium; (4) the layers of tissue from which the indusium arises, he is of opinion that *P. hybrida* is no hybrid, but an independent species, occupying a systematic position between *Ceterach* and *P. Scolopendrium*, similar to that of *P. Hemionitis*, to which, in its anatomy and morphology, it is most nearly akin. It is endemic in the southern Quarnero Archipelago, in the Adriatic Sea.

We regret to note the death, at the age of seventy-five, of M. Philippe van Tieghem, Professor of Botany at the Paris Natural History Museum. Van Tieghem's most important botanical work was on the comparative anatomy of the vegetative structure of the flower in numerous families of seed-plants. Many of these communications were published in the *Annales des Sciences Naturelles*, of which he was botanical editor from 1882, when he succeeded Decaisne, until the time of his death. One of the best known and most important appeared in 1869 on the comparative anatomy of the female flower and fruit in Gymnosperms, in which he attacked the problem of the morphology of the cone-scales from an anatomical point of view, and demonstrated a uniform plan of structure in this organ throughout the Pinaceæ. In 1884 he produced his *Traité de Botanique*, the second edition of which (1891) contained 1855 pages. His systems of classification were, as far as concerned the flowering plants, based primarily on characters of the ovule; they were conceived on too narrow lines, besides being burdened with a novel and extensive terminology. Van Tieghem also made valuable contributions to the study of the phycomycetous fungi, especially on the morphology and physiology of the Mucorineæ.

The *Journal of the Royal Horticultural Society* (xxxix. part 3, April) contains an interesting illustrated paper by Mr. E. A. Bunyard on "The History and Development of the Strawberry," and a lecture by the Rev. G. Henslow on "The Evolution of Plants and the Directivity of Life, as shown by the Reproductive Organs"; as well as contributions from the Wisley Laboratory and many papers dealing with horticultural matters.

The degree of D.Sc. in Botany has been conferred by the University of London on Mr. H. F. Wernham, of the Department of Botany, British Museum.



P. Highley del. et lith. West, Newman imp.

Poa remotiflora *Murb.* *f.* exilis.

POA REMOTIFLORA Murb. IN JERSEY.

By C. E. Salmon, F.L.S.

(Plate 532.)

In the *Journal of Botany* for 1913, p. 16, mention was made of a *Poa* found in the Channel Islands in 1910, and thought to be new to Great Britain and the Sarnian flora. This diminutive grass seems to have been first observed by Tommasini in 1872, and to have been first published by J. Freyn in his "Flora von Süd-Istrien" (Zool.-Bot. Gesellsch. Wien, xxvii. 469 (1877)) as "*Poa annua* L. β *exilis* Tommas. ined., 1–3 stemmed, in minute rosettes, only 2–8 cm. high; panicle few-flowered, spike-like or with only 1–2 horizontally-spreading branches at the base . . . (Tommasini, 1872)."

In 1895 Battandier and Trabut (Fl. de l'Algérie, 206) introduce the grass as *P. annua* L. β *remotiflora* Hackel, with the following meagre description: "Épillets allongés linéaires, 5–6 fleurs espacées."

It was, however, left to S. Murbeck to work out minutely this interesting grass, and the results of his careful examination may be found in his *Contribution de la Flore du Nord-ouest de l'Afrique*, iv. 22 (1900), where he compares it with allied forms, and gives valuable figures.

I cannot do better than quote his description verbatim, omitting as unnecessary for British botanists the contrasting characters of *P. dimorphantha*.

"*P. remotiflora* (Hack.) nob.—Nova spec.—Annua, foliorum fasciculis sterilibus destituta. Culmi plerumque numerosi, fasciculati, e basi arcuata adscendentes, 5–20 cm. alti, lævissimi. Vaginæ glaberrimæ, læves, inferiores compressæ et dorso carinatæ. Ligula foliorum inferiorum truncato-, superiorum triangulari-oblonga. Laminæ lineares, planæ vel subcomplicatæ (explanatæ 1·5–4·5 mm. latæ), læte virides, molles, margine et ad nervum medianum scabriusculæ, cæterum glaberrimæ, etiam foliorum inferiorum apicem versus sat subito acutatæ. Panicula triangulari-ovalis vel oblongo-rhomboidea, duplo vel triplo longior quam latior (longit. 3·5–7·5 cm., latit. 1·5–3·5 cm.), unilateralis, laxa, ramis 2–3-nis, lævibus, erecto-patulis, patentibus vel infimis post anthesin patentissimis attamen non refractis. Spiculæ oblongæ vel oblongo-lineares, acutiusculæ, a lateribus compressæ, 2–5-floræ, 3·5–5·5 mm. longæ, virides vel violaceo-variegatæ, rachilla glaberrima. Gluma inferior ovato-oblonga, subacuta, 1-nervis, 1–1·3 mm. longa; superior oblonga vel ovato-oblonga, obtusa vel acutiuscula, 3-nervis, 1·5–2 mm. longa. Flores in quaque spicula remoti, rachillam non vel vix occultantes, sat dissimiles: *inferiores* hermaphroditi, subproterandri, oblongo-lanceolati, 2–2·8 mm. longi; glumella inferior dorso rotundata, a basi usque ad ultra medium nervis 5 dense sericeo-villosis ornata, apice membranaceo rotundato-obtusa; glumella superior inferiorem subæquans, a basi fere usque ad apicem ad nervos sericeo-villosa; lodiculæ oblique triangulares;

filamenta staminum glumellis non vel vix longiora; antheræ 0·22–0·33 mm. longæ, albidæ, loculis ovoideis, circ. duplo longioribus quam latioribus; caryopsis oblongo-ovoidea, quam glumella inferior circ. tertia parte brevior; flos *supremus* nunc hermaphroditus nunc femineus, post anthesin ovoideo-lanceolatus, acutiusculis, 1·8–2 mm. longus, stipiti eo tertia vel quarta parte breviori insidens, erectus; glumella inferior superiore paullo longior, ut superior fere usque ad apicem ad nervos sericeo-villosa; lodiculæ minutissimæ, triangulares; caryopsis ovoidea, quam glumella inferior tertia vel quarta parte brevior.—Fl. & fr. Mart.

"*Syn.* *P. annua* var. *remotiflora* Hack. in Baenitz Herb. Europ. Lief. xxxix. (1880), n. 3999 (sine diagn.). *P. annua* *β remotiflora* Hack. in Batt. & Trab. Fl. Algér. v. 206 (1895).

"*Icon.* Tab. nostra, xiv. fig. 12.

"*Distribution géographique. Algérie*: Lieux humides entre Philippe-ville et Damrémont (Murb. & Olin.); d'après Batt. & Trab., *l. c.*, aussi à Rouïba et à Teniet-el-Haad.—*Grèce*: In locis incultis prope Athenas (Heldreich, 1878).

"Cette plante, distinguée il y a déjà une vingtaine d'années par Hackel comme variété du *Poa annua* L., mais dont une description n'a été publiée qu'en 1895 par Trabut,[*] est très voisine du *P. annua*, auquel elle a été réunie aussi par cet auteur. Elle ne paraît toutefois pas avoir été jusqu'ici étudiée en détail. En réalité, elle présente plusieurs caractères importants, qui la différencient de l'espèce de Linné (voir ci-dessous). L'extrême petitesse des anthères, qui sont constamment 2 à 3 fois plus courtes que dans cette dernière, me paraît surtout constituer une différence si essentielle, qu'il est préférable de regarder cette plante comme une espèce à part.

"Un *Poa remotiflora* ['*Poa* (*Arctophila*) *remotiflora*'] se trouve déjà dans Ruprecht (Fl. samoj. p. 63, 1845).—Mais comme la plante de Ruprecht appartient au genre *Colpodium* Trin. (*Arctophila* Rupr.) et qu'il n'est pas probable qu'elle constitue une espèce distincte du *Colpodium pendulinum* Griseb., je n'ai pas vu d'inconvénient à employer ici comme désignation spécifique le nom de variété donné par Hackel.

"On trouvera ci-dessous un aperçu des caractères par lesquels se distinguent entre eux les *Poa dimorphantha*, *remotiflora* et *annua*. Il se fonde, comme les descriptions données plus haut, non seulement sur des spécimens séchés, mais aussi sur des exemplaires vivants, cultivés dans le Jardin botanique de Lund.

"*P. remotiflora.*	"*P. annua.*
"*Chaumes* arqués-ascendants.	"*Chaumes* ascendants ou couchés.
"*Glumes inférieures* comprimées, carénées sur le dos.	"*Glumes inférieures* subcylindriques, à peine carénées sur le dos.

---

[*] Trabut la décrit ainsi (*l. c.*): "Epillets allongés linéaires, 5–6 fleurs espacées."

"*P. remotiflora.*	"*P. annua.*
"*Feuilles* scabres sur les bords ; même les inférieures assez brusquement atténuées vers le sommet.	"*Feuilles* scabres sur les bords ; même les inférieures brusquement contractées au sommet.
"*Panicule* ovale-triangulaire ou oblongue-rhomboïdale, de 1·5 à 3 fois aussi longue que large, semi-conique (à base semi-orbiculaire) ; rameaux infér. étalés après l'anthèse.	"*Panicule* triangulaire, de 1·2 à 1·6 fois aussi longue que large, semi-conique (à base semi-orbiculaire) ; rameaux étalés ou réfléchis après l'anthèse.
"*Fleurs* espacées, assez dissemblables, les *inférieures* (de 1 à 4) longues de 2 à 2·8 mm., hermaphrodites, lancéolées-oblongues après l'anthèse ; les *supérieures* (1 ou 2) généralement femelles, subaiguës, étroitement ovoïdes après l'anthèse, longues de 1·8 à 2 mm., la terminale de $\frac{1}{4}$ à $\frac{1}{3}$ plus longue que son pédicelle.	"*Fleurs* imbriquées, peu dissemblables, les *inférieures* (de 1 à 5) longues de 2·5 à 4 mm., hermaphrodites, lancéolées- ou ovales-oblongues après l'anthèse ; les *supérieures* (1 ou 2) généralement femelles, aiguës, étroitement ovoïdes après l'anthèse, longues de 2 à 2·5 mm., la terminale au moins 2 fois aussi longue que son pédicelle.
"*Filets* des étamines pas ou à peine plus longs que la glumelle inférieure et n'atteignant pas même le milieu de la fleur supérieure contiguë.	"*Filets* des étamines pas plus longs que la glumelle inférieure et n'atteignant jamais le sommet de la fleur supérieure contiguë.
"*Anthères* longues de 0·22 à 0·33 mm., à loges ovoïdes, environ 2 fois aussi longues que larges."	"*Anthères* longues de 0·6 à 0·8 mm., à loges oblongues-linéaires et de 4 à 5 fois aussi longues que larges."

Ascherson & Graebner (Syn. Mittel-eur. Fl. ii. 389, 1900) refer to our plant as *P. annua* L. subsp. *exilis*, and consider that the small plant mentioned by Freyn in 1877 should be separated as a form, "*β. Tommasinii.* Low-growing, 2–8 cm. high ; panicle few-spiked, clustered together above." They also remark that this form of the subspecies (corresponding to *P. annua* D. *pauciflora*) occurs in their Central European region only, and not the typical state. This is certainly also the Channel Island form.

Rouy (Fl. Fr. xiv. 268, 1913) places the plant as a "race" under *Poa annua* ; he does not differentiate the dwarf state, and mentions localities in Corsica and the Department of Var.

The chief distinctive characters of *P. remotiflora* may be easily contrasted with those of *P. annua* in the table given by Murbeck, the more obvious features being the oblong spike (often quite simple in f. *exilis*), the panicle-branches non-reflexed after flowering, the non-imbricate flowers and the very small anthers. These points serve to distinguish the plant from the dwarf, starved pale-yellow states of *P. annua* of our trodden path-margins and dry places.

I am much indebted to Dr. O. Stapf for finally determining the Jersey specimens; he remarks: "It differs from the typical Mediterranean form in having smaller, relatively stouter florets with longer hairs." These characters will be useful to those who separate the dwarf f. *exilis* from typical *remotiflora*.

The nomenclature is :—

Poa remotiflora Murb. Contrib. Fl. Nord-ouest Afrique, iv. 22 (1900).

P. annua L. β *remotiflora* Hackel in Battand. & Trabut, Fl. Algér. v. 206 (1895).

P. annua L. subsp. *exilis* Aschers. & Graeb. Syn. Mittel-eur. Fl. ii. 389 (1900); Battandier, Supp. Fl. Algér. 90 (1910).

P. annua L. "race" *P. exilis* Rouy, Fl. Fr. xiv. 268 (1913).

Forma *exilis*.

P. annua L. β *exilis* Tommas. ex Freyn, Fl. Süd-Istrien, Zool.-Bot. Gesellsch. (Wien) xxvii. 469 (1877).

P. annua L. subsp. *exilis* Aschers. & Graeb. forma B. *Tommasinii* Aschers. & Graeb. Syn. Mittel-eur. Fl. ii. 390 (1900).

Distribution.—*Jersey*: Sandy places near the sea, March, 1877, *J. Piquet*! (Hb. Mus. Brit.) (f. *exilis*). Near Fort Regent, West Mount, and other places, frequent, *J. W. White & C. E. S.*, 1910 (f. *exilis*). *Guernsey*: Scart Point, Ap. 1891, *I. H. Burkill* (Hb. Kew) (f. *exilis*). *France, S.*: Var. *Portugal. Middle and Southern Italy. Corsica. Sicily. S. Istria. Greece*! *Morocco. Algeria. Cyrenaica. Syria. Persia.*

Exsicc.—Baenitz, Herb. Europ. Lief. xxxix. (1880), no. 3999; Heldreich, Herb. Græc. Norm. 1098!

Icon.—Murbeck, l. c. t. xiv. fig. 12.

Explanation of Plate 532.

1–2. *P. remotiflora* f. *exilis*, drawn from Jersey specimens, natural size. 3. Ditto, luxuriant. 4. Spikelet, enlarged four times.

NOTES ON BRITISH PLANTS.

By C. E. Moss.

III. The Genus Alsine.

Since the appearance in this Journal (xxxvii. 317, 1889) of Hiern's article on *Alsine*, there has been much uncertainty in the minds of British botanists regarding the names of the plants which are usually placed in the genus. Mr. Hiern, it will be remembered, substituted *Alsine* (Hiern) for *Spergularia*, and *Minuartia* (Hiern) for *Alsine* (Gaertner). H. & J. Groves, in their edition of Babington's *Manual* (1904), adopted both of Hiern's substitutions, although they retained a "suborder *Alsineæ*" for a group of plants without an *Alsine*, and placed their *Alsine* (Hiern) in a "suborder *Polycarpeæ*." Rendle & Britten (List, 1907) also adopted *Minuartia* (Hiern) and *Alsine* (Hiern). On the other hand, Druce (List, 1908; Hayward's Bot. Pocket Book, 1909), Marshall (Lond. Cat. ed. 10 (1908)) and Carter (Gen. Brit. Plants, 1913) continued the union of *Alsine* (Gaertn.) with *Arenaria*, after de Candolle (Prodr. iv. 401, 1824) and Bentham & Hooker (Gen. Pl. i. 150, 1862). Syme (Eng. Bot. ii. 107, 1864) and Williams (in Journ. Bot. xxxiv. 427, 1896) had both adopted *Alsine* (Gaertn.).

I do not think there is very much to be said in favour of the union of *Alsine* (Gaertn.) and *Arenaria*, unless a great many other genera of the family *Dianthaceæ* (or *Caryophyllaceæ*) are also united. It is admitted that the modern genera of the family are very closely allied, and that they are indeterminable in the absence of ripe fruit; but it is at least in keeping with the scale all but universally adopted for the other genera of the family to retain one name (*Alsine* Gaertn. or *Minuartia* Hiern) for the plants whose capsules dehisce with the same number of teeth as the ovary has stigmas, and another name (*Arenaria*) for the plants whose capsules dehisce with twice as many teeth as the ovary has stigmas. The union of both groups of plants in one genus would logically demand the union of many other genera of the family; and, unless the changes were very comprehensive indeed, there would be no gain from the practical point of view of identifying the genera without fruit, whilst the changes of specific names on the large scale that would be necessary to bring about this practical benefit would probably not meet with general acceptance. Hence, the points that have to be decided are: (1) whether *Alsine* (Gaertn.) shall be retained in the commonly accepted sense, or (2) whether *Alsine* (Hiern) shall be applied to *Delia* (Dum.) and the name *Minuartia* (Hiern) given to *Alsine* (Gaertn.).

I must state at the outset that I am not in sympathy with the changing of any established generic name on grounds of priority alone; and, in the *Cambridge British Flora* I do not propose to make a single generic change of this kind. This decision is in the fullest accord with the general aims and spirit of the International Rules, and indeed is logically demanded from those who accept the principle of a list of *nomina conservanda* of genera.

The changes in the names of species which result from the substitution of one generic name for another are too numerous to allow established names of genera to remain long in the arena of nomenclatorial conflicts. Whenever it is proved that the recognized name of any genus is incorrect from the point of view of priority, the already established name of that genus should be automatically placed on the list of *nomina conservanda*. Only those botanists who have given special attention to generic names realize how many changes would be involved if the so-called "law" of priority were rigidly followed in the matter of the names of genera. In fact, I personally regret there is no list of *nomina conservanda* of species; but the task of preparing such a list would be colossal; and there is no wonder therefore that the Vienna

Congress shrank from a Herculean undertaking and contented itself with laying down a rule of priority for the names of species.

Returning to the question of *Alsine* (Gaertn.) versus *Minuartia* (Hiern), the matter is not a very complicated one if the history of *Alsine* is chronologically considered.

Linnæus, in the first edition of his *Species Plantarum* (p. 272, 1753), had only two species of *Alsine*. The first was *Alsine media* L. and the second *A. segetalis* L. It is clear that if priority alone be allowed to determine the issue, the name *Alsine* should be used for one of these two species. Each species has its claim.

Scopoli (Fl. Carn. ed. 2, i. 224, 1772) took the first of the two species, and defined his *Alsine* to include it and it alone. This species is now universally regarded as a *Stellaria*—it is the common chickweed, *S. media* Villars; and hence the *Alsine* of Scopoli (1772) sinks in *Stellaria* L. (1753). Hiern (*loc. cit.*) therefore fixed his attention on the second species, *A. segetalis* L. This species is sometimes placed in *Spergularia* and sometimes placed in a separate but closely allied genus, *Delia*. Mr. Hiern retained *Alsine* (Hiern) for *Spergularia* (including *Delia*), and gave the requisite new combinations for the British species involved. *Spergularia*, however, is now a *nomen conservandum*; and to those of us who accept the *nomina conservanda*, Hiern's changes under this heading are now obsolete. If, however, *A. segetalis* L. is placed in *Delia* (Dumortier Fl. Belg. 110, 1827) as is done by some authorities (*e.g.*, Ascherson & Graebner Fl. Nordostd. Flachl. 316, 1898), Hiern's view would still hold good —if, as I have said, priority alone be allowed to determine the matter. It is doubtless from this point of view that Schinz & Keller (Fl. Schweiz ed. 3, 204, 1909), whilst retaining *Spergularia*, adopt *Alsine* (Hiern emend.) for *Delia*.

This change having being accomplished, it remained to find a name for the plants which have been usually referred to *Alsine* (Gaertn.). Hiern utilized *Minuartia* (Hiern) for the purpose, and made the necessary new combinations for the British plants; and, as I have already stated, Hiern has been followed in this matter by H. & J. Groves and by Rendle & Britten, and also by Schinz & Keller (*op. cit.* p. 200). The position of these botanists is perfectly logical, if judged from the standpoint of priority.

There is, however, another point of view to be considered, as will be seen by continuing the study of the historical development of the Linnean concept of *Alsine*.

In the second edition of the *Species Plantarum* (p. 389, 1762) Linnæus added a third species to his genus. The added species was *Alsine mucronata* L., which has been an *Alsine* ever since in the great majority of books on botany. Linnæus placed this species between the other two, his species now being respectively: (1) *A. media* L. (= *Stellaria media* Villars), (2) *A. mucronata* L., and (3) *A. segetalis* L.

Gaertner (Fruct. ii. 223, t. 129, 1791), in founding his genus *Alsine*, took the second edition of the *Species Plantarum* as his starting-point. He rightly passed over the first species (*A. media* L.), as this had already been correctly placed in *Stellaria* by Villars; and then it was perfectly natural that he should take the second species (*A. mucronata* L.) as the type of his genus. Thus, from Gaertner's point of view, the third species (*A. segetalis* L.) does not enter into the discussion. Gaertner's view was adopted by Wahlenberg (Fl. Lapp. 1812; Veg. Helv. 1813; Fl. Suec. 1826), who made the necessary new combinations for the species as he dealt with them in his various works. Wahlenberg has been followed by the vast majority of botanists, including Syme & Williams in this country. Wahlenberg, in fact, is usually cited as the authority of the genus, though Wahlenberg himself refers his *Alsine* to Gaertner. It is, from my point of view, quite immaterial whether Gaertner or Wahlenberg is cited as the authority: the genus is the same in either case, even though Wahlenberg has referred species of *Spergularia* to it; it is, of course, erroneous to ascribe it to Scopoli (*cf.* Dalla Torre & Sarntheim Gen. Siphonog. 157, 1900), for the *Alsine* of Scopoli, as has been shown, has nothing to do with *Alsine* of any European botanists and must be sunk in *Stellaria* L.

With regard to Gaertner's use of the second edition of the *Species Plantarum*, it must be borne in mind that the first edition was a very rare book in his day, and, indeed, almost inaccessible to the great majority of the botanists of the eighteenth and of the first half of the nineteenth centuries. A reprint of the first edition, and greatly increased facilities of travel, have rendered the first edition accessible to the majority of botanists; but the early botanists adopted the only sensible and practicable course when they used the second rather than the first edition of the *Species*, because they could not check or verify the names of the first edition. The fashion of citing the second edition as the starting-point still persists, as, *e.g.*, in Rouy & Foucaud's Fl. de France; and it is one of the easiest tests of a mere copier to find if he adds "1753" to the page of the second edition. It is a question whether it would not have been better, in the interests of nomenclatorial stability, for the Vienna Congress to have adopted the second instead of the first edition as the commencement of the names of vascular plants, because the second edition had virtually, for the reasons just given, been taken as the starting-point of nomenclature by nearly all the earlier post-Linnean botanists, who have thus impressed the names of the second edition so deeply in botanical literature and botanical thought that it is useless nowadays to attempt to change them.*

---

* It was with all this in mind that I decided (see Cambr. Brit. Fl. ii. p. xiii. 1914), in order to avoid some undesirable changes of specific names which would be necessitated by rigidly adhering to the first edition of the *Species Plantarum* as the starting-point of nomenclature, to begin with the second edition in the case of those species which were subdivided into two or more species by Linnæus himself in the second edition. In the case of these latter species, it is the names of the second edition that have become common to all countries; and thus this slight departure from the letter of the Vienna Rules will always result in conserving established specific names. I can conceive of no one, except the stickler for mere priority, objecting to this little innovation.

Bearing in mind that *Alsine* (Gaertn., Wahlenberg) is the name that is to-day in almost universal use and that it has been so since the time of Wahlenberg, those botanists who accept the principle of a list of *nomina conservanda* of genera, can offer no legitimate objection against the suggestion now made of placing *Alsine* (Gaertn., Wahlenberg) on the list in question. It seems to me that this is the only legal method of avoiding the undesirable substitution of the name *Minuartia* (Hiern) for the established name *Alsine* (Gaertn., Wahlenberg): the plan would leave *Delia* free for those who desire to use it, and seems indeed to be the logical corollary of the conservation of *Spergularia.*

The following citations of the British species are given on the assumption that *Alsine* (Gaertn., Wahlenberg) is regarded as a *nomen conservandum.*

ALSINE L. Sp. Pl. ed. 2 (non ed. 1) emend. Gaertner Fruct. ii. 223, t. 129 (1791); Wahlenberg Fl. Lapp. 127 (1812); Fenzl in Endlicher Gen. Pl. 964 (1836–1840); Bentham & Hooker Gen. Pl. i. 150 (1862) as a section; Pax in Engler & Prantl Pflanzenfam. iii. 1b, 82 (1888); Rouy et Foucaud Fl. France iii. 261 (1896); non Scopoli nec Hiern nec Schinz & Keller; *Minuartia* L. Sp. Pl. ed. 1, ampl. Hiern in Journ. Bot. xxxvii. 320 (1899).

1. ALSINE STRICTA Wahlenberg Fl. Lapp. 127 (1812); *Spergula stricta* Swartz in Kongl. Vet. Acad. Handl. Stockholm xx. 235 (1799); *Arenaria uliginosa* [Schleicher ex] DC. Fl. Franç. iv. 786 (1805)!; *Alsine uliginosa* Syme Eng. Bot. ii. 115 (1864); *Minuartia stricta* Hiern in Journ. Bot. xxxvii. 320 (1899); non *Arenaria stricta* Michaux Fl. Bor. Am. i. 274 (1803).

The only British station of this plant known to British botanists is in Upper Teesdale; but by Rouy & Foucaud (*op. cit.* p. 266) the plant is also recorded for Ireland.

2. ALSINE VERNA Bartling in Bartling & Wendland Beitr. ii. 63 (1825); Syme Eng. Bot. ii. 109 (1864); *Arenaria saxatilis* Hudson Fl. Angl. 168 (1762) non L., incl. *Ar. laricifolia* non L.; *Ar. verna* L. Mant. Pl. i. 72 (1767); *Ar. liniflora* Jacquin Fl. Austr. v. 22, t. 445 (right-hand figure) (1778) ? non L.; *Ar. juniperina* Withering Arr. ed. 3, 424 (1796) non L., incl. *Ar. laricifolia* non L.; *Al. saxatilis* Wahlenberg Veg. Helv. 87 (1813); *Minuartia verna* Hiern in Journ. Bot. xxxvii. 320 (1899).

The British forms of this species are very variable; and some of them have been given names by British botanists. However, I am not able to state whether or not these names have been correctly applied.

3. ALSINE RUBELLA Wahlenberg Fl. Lapp. 128, t. 6 (1812); Syme Eng. Bot. ii. 111 (1864); *Arenaria gieseki* Hornemann in Fl. Dan. fasc. xxvi. 5, t. 1518 (1818); *Ar. hirta* [Wormskiold ex] Hornemann *op. cit.* fasc. xxviii. t. 1646 (1823); *Ar. rubella* Smith Eng. Bot. iv. 267 (1824); *Minuartia rubella* Hiern *op. cit.* 320 (1899).

This is an Arctic species not known to occur in Central Europe.

4. ALSINE TENUIFOLIA Crantz* Inst. ii. 407 (1766); Wahlenberg Veg. Helv. 86 (1813); Syme Eng. Bot. ii. 112 (1864); *Arenaria tenuifolia* L. Sp. Pl. 424 (1753)!; *Minuartia tenuifolia* Hiern in Journ. Bot. xxxvii. 321 (1899) non Nees *in litt.* ex Martius Hort. Erlang. 44 (1814); *M. leptophylla* H. & J. Groves in Babington's Man. ed. 9, 61 (1904).

5. ALSINE SEDOÏDES Kittel Fl. Deutschl. ed. 2, ii. 997 (1844) non Froelich *in litt.*, ex Koch Syn. 114 (1835); *Cherleria sedoïdes* L. Sp. Pl. 425 (1753); *Alsine cherleria* Grenier et Godron Fl. France i. 253 (1848); Rouy et Foucaud Fl. France i. 253 (1848); *Al. cherleria* Petermann Deutschl. Fl. 851 (1849); Syme Eng. Bot. ii. 108 (1864); *Minuartia sedoïdes* Hiern in Journ. Bot. xxxvii. 321 (1899).

I take it that the International Rules, being retrospective in their action, necessitate the adoption of *A. sedoïdes* Kittel.

This is an Alpine species unknown in northern Europe: there are very few members of the British flora which have such a geographical range as this.

6. ALSINE PEPLOÏDES Crantz Inst. ii. 406 (1766); Wahlenberg Fl. Suec. i. 282 (1826); *Arenaria peploïdes* L. Sp. Pl. 423 (1753)!; *Honckenia peploïdes* Ehrhart Beitr. ii. 181 (1788); Syme Eng. Bot. ii. 106 (1864); *Minuartia peploïdes* Hiern in Journ. Bot. xxxvii. 322 (1899).

The chief points dealt with in this note regarding *Alsine* are thus summarised:—

(1) In the first edition of the *Species Plantarum* (1753) of Linnæus there are two species of *Alsine*—*A. media* L. and *A. segetalis* L.

(2) Scopoli (1772) took the first of these as the type of his *Alsine*; but as *A. media* L. is now universally recognised as a *Stellaria*, the genus *Alsine* Scop. disappears.

(3) Hiern (1899) took the second of the above species as the type of his *Alsine*. Sometimes this species is placed in *Spergularia*, which is a *nomen conservandum*; and thus *Alsine* Hiern is obsolete. By other authorities the species is placed in *Delia*, and thus, judging by priority alone, *Delia* Dum. would become *Alsine* Hiern emend. Schinz & Keller.

(4) In the second edition of the *Species Plantarum* (i. 1762) Linnæus added a third species of *Alsine*, *A. mucronata* L.

(5) Gaertner (1799) took this third species as the type of his *Alsine*, and was followed by Wahlenberg and almost all other botanists. The name *Alsine*, as thus defined, is consequently established firmly in botanical literature; and, on this ground, it is here suggested that the name be placed on the list of *nomina conservanda*.

---

* *Alsine* Crantz Inst. ii. 404 (1766) includes *Sagina* L., *Elatine* L., *Mœhringia* L., *Buffonia* L., *Polycarpum* L., *Alsine* L. (partim), *Arenaria* L., and *Spergula* L., but not *Cherleria* L.

NOTES ON DR. FOCKE'S *RUBI EUROPÆI* (1914).

By the Rev. W. Moyle Rogers, F.L.S.

(Concluded from p. 182.)

R. hypoleucus Lefv. & Muell. As this is the earlier of the two names suggested in recent years for our plant (the date of publication being *R. hypoleucus* L. & M. 1859, *R. adscitus* Genev. 1860), and as there seems to be no question as to the identity of the two plants, it appears best that we should now retain the earlier name *hypoleucus*—accepted by us in 1905 (instead of *R. micans* Gren. & Godr.), after the publication of Dr. Focke's work in Aschers. & Graebn. Fl. Mitt.—rather than again follow him in his final preference for *R. adscitus*. His reason for such preference in Rubi Europ. is as follows:—" Speciei cognitio ex hac descriptione [i. e. Genev. Mém. Soc. M. et L. viii. p. 88] derivata est; nomen *adsciti* igitur præfero." I have not, however, seen authentic specimens of Continental *hypoleucus*; and so, personally, I should have also preferred the name *adscitus*, as our typical and widely distributed British plant agrees admirably with Genevier's specimens and description, as well as with the living examples of his plant that I have seen abundantly in the Channel Islands, Brittany and Normandy. Compare Journ. Bot. 1905, p. 202, and my *Handbook of British Rubi*, p. 48 ("*R. micans* Gren. & Godr.").

A brief account of my *R. Lettii* (Journ. Bot. 1901, p. 381) is followed by the note, "Formam borealem *R. adsciti* esse e speciminibus exsiccatis suspicor"—a suggestion which I considered only to reject, when I preferred placing it amongst our *Egregii* because of the Koehlerian-like armature of all its stronger examples. While obviously recalling *R. adscitus* in the very greyish tint of the whole plant, *R. Lettii* seems best placed between *R. criniger* and *R. Gelertii*. Dr. Focke confines it to Ireland, and thus far the strong, highly glandular type has not been found elsewhere, though what seems to be a weaker form of the same plant occurs in some of our western counties, especially in Cardigan, Salop, and Hereford. Between his *R. adscitus* and his *R. vestitus* he also places a plant of the Plymouth neighbourhood (which I cannot now trace) as "*R. adscitus* × *rusticanus*. Planta spectabilis, luxurians, alte scandens, thyrsis longis et inflorescentiis compositis amplis patulis ornata. Singuli frutices in eodem loco variabiles; occurrunt in plantis magnis interdum folia semper fere ternata cum foliolis subtus virentibus. Sterilis videtur. V. v. duce Archer Briggs." Our reasons for preferring the name *R. leucostachys* Sm. to the slightly later one *R. vestitus* Wh. & N.—which is generally adopted on the Continent and is still adhered to by Dr. Focke—are given in full in Journ. Bot. 1905, p. 202, and need not be repeated or added to here. This is placed by him in closer relation to *R. hypoleucus* (*R. adscitus*) than in our list.

It is when he comes to deal with the *Vestiti* that his suggestion of a hybrid origin for some of the plants becomes more frequent; and I regret that I cannot refer fully to this part of his work. But the following paragraph is so remarkable that the readers of the Journal may be glad for me to quote it in full:—“Conjecturæ de origine hybridogenâ nonnullorum Ruborum *Vestitis* similium. *Rubus adscitus* et *R. vestitus*, simili modo ac *Rubi Suberecti*, gregem naturalem bene distinctam constituunt. Repeiuntur vero species complures nonnullis characteribus ad *Vestitos*, aliis ad diversos *Rubos* vergentes. Quæritur anne tales species ambigentes originis hybridogenæ sint, præcipue in ævo diluviano vel pliocæno ortæ. Illis temporibus nondum species nobis cognitæ hodiernæ floruerunt, sed formæ atavæ, quarum proles mutata et genuina et hybridogena nunc Europam incolit.” This is followed by the heading “Species et prospecies, quarum origo hybridogena e Rubis Vestitis suspicari potest,” and a table, from the fourteen lines of which the following are examples:—

“ Species atavæ (vel recentes) parentes.	Species hybridogenæ.	Series vel subseries.
“ *R. adscitus* et *R. sulcatus.*	*R. leucandrus.*	*Silvatici.*
R. vestitus et *R. sulcatus.*	*R. macrophyllus.*	,,
,, *R. vulgaris.*	*R. pyramidalis.*	*Vestiti.*
,, *R. egregius.*	*R. mucronatus.*	*Semi-Egregii.*
,, *R. cæsius.*	*R. Balfourianus.*	*Corylifolii.*”

R. gymnostachys Genev. This name, given as a variety of *R. leucostachys* in my *Handbook* and in Lond. Cat. ed. x., is now, contrary to Dr. Focke's earlier views (for which see Journ. Bot. 1905, pp. 76, 202), considered by him too indefinite and unsatisfactory; while J. Lange's *R. macrothyrsus* (which we have treated as a synonym of *R. gymnostachys*) takes its place, and becomes a numbered “species.” He says, with reference to *R. gymnostachys*, “Vidi specimina Genevierii a *R. macrothyrso* non distinguenda, sed botanici Gallici auctorem diversos Rubos sub hoc nomine comprehendisse asserunt.” And, again, under *R. macrothyrsus*, he adds, “Aspectus hujus plantæ ab illo *R. vestiti* valde discrepat, sed notæ differentes vacillant. E ramis exsiccatis facile ‘species’ artificiales construuntur, sed specimina Britannica, Hersynica et Holsatica satis congruere videntur.” With us the name *gymnostachys* has certainly not hitherto been applied to one form only, but has included slightly varying forms of *R. leucostachys*, together with our strongly marked and highly glandular Bangor (Carnarvon) plant, which is clearly indistinguishable from Lange's *R. macrothyrsus* as supplied to me from “near Kiel, Holstein,” by Messrs. Friderichsen and Gelert. Quite the same plant was found in Northants by Mr. Druce last year, and my herbarium contains several other sheets from English counties—from Yorks and Flint to Somerset, Dorset and Devon. So the name *gymnostachys* may well be dropped from our *Rubus* list, and *macrothyrsus* substituted for it, either (preferably, I think) as a strongly marked variety of *R. leucostachys*, or in an independent position, as in *Rubi Europæi*.

R. leucanthemus P. J. Muell.? There seems to be no reference to this in *Rubi Europæi* except as a synonym of "*R. vestitus*," with the note "Frutex *R. vestiti* unicus in vicinitate oppidi Weissenburg observatus sub hoc nomine descriptus est." Perhaps some of the plants for which I have from time to time suggested this name would be better placed, as varying forms or hybrids, under *R. hypoleucus*; but most of them from widely separated counties —Westmoreland to Dorset in the west, and Sussex, Kent and Surrey in the east — agree closely with the greater part of Genevier's description of *R. leucanthemus* Müll.!, as reported by him from several districts in France. So there seems good ground for the provisional retention of this name in our list, either in an independent position between *R. hypoleucus* and *R. leucostachys*, or as a variety (or possible hybrid) under one of them.

R. danicus Focke. Dr. Focke has found himself obliged to alter this name, as he explains "nomen erroneum; planta a botanicis Danicis quidem lecta sed nondum in Daniâ ipsâ reperta est." He now calls it *R. orbifolius* (Lefvre, exs.) Boulay in Rouy et Cam. Fl. Fr. vi. 22"; and keeps it, as before, near *R. macrophyllus*. He still regards our British plant as one with it:— "Sowie zerstreut in England and Wales." *R. mollissimus* Rogers, which in our list appears (after "*R. danicus*") as a variety under *R. hirtifolius*, is placed as a synonym for "*R. subcanus* P. J. Muell. in Boulay, Ronc. Vosg. p. 34, no. 27 (1866)," though the only distribution mentioned, is "Zerstreut im Westlichen England, in Wales und Irland," in exact agreement with that given for *mollissimus* in my *Handbook*, p. 49.

R. egregius Focke, var *plymensis* Focke. nov. var. This is an addition to our Flora, the description added to the above name being as follows:—"Eglandulosus vel glandulas brevissime stipitatis in caule, inflorescentiâ vel bracteis sparsas gerens. Caules sæpe sat dense pilosi; inflorescentia variabilis, nunc angusta longa subracemosa, nunc vario modo composita.—Britannia." A further reference to it later is "Die var. *plymensis* in südlichen England, besonders aus dem Tale des Plym und an andern Stellen bei Plymouth bekannt." Dr. Focke wrote to me about this plant two years ago as follows:—"Once I gathered, with Mr. Briggs, a late-flowering, small *Rubus* in the Valley of the Plym. In general aspect it was near *R. longithyrsiger*, being in fruit at the same time; but the stronger stems of the unnamed plant were of a more upright growth. Lately I examined my specimens anew, and I could find no essential difference from small forms of my *R. egregius*. Usually this latter species bears some scattered glands, whereas the Devon plant is eglandular." Probably I have not seen this "Devon plant" growing, and should have failed to place it among our glandular Egregians if I had come across it. Typical *R. egregius*, so far undetected in Britain, has always proved a difficult species to me; and though I have long had a good series of specimens, I have so far found myself unable to understand it. The account of "*plymensis*" is followed by the following note:—"(Forma: *effeminatus* Focke, nov. nom.; molliter pilosus inflorescentiæ extra axillares longæ, multifloræ; sepala longe acuminata, in flore patentia in fructu reflexa; stamina stylis multo breviora. Fruticem vidi unicum haud procul ab Oxford Britanniæ)." I can throw no light on this note, such as seems necessary before the name can be admitted into our list. Some of the other more difficult plants in our "middle and collective group" *Egregii* come in for original and interesting treatment.

Thus under *R. mucronatus* Blox. (p. 189) we find the note: "Occurrunt vero, præcipue in Britanniâ mediâ et meridionali, formæ complures ambiguæ, quæ hinc inde species constantes æmulantur, præcipue:—

"*R. mucronatus* var. *nudicaulis* Rogers Handb. Brit. Rub. (1900) 56, et formæ copiosius aculeolatæ: ? *R. oigocladus* (cit. Muell. et Lefvr.) Rogers *l. c.* 65; non Muell. et Lefvr. ex Sudre.

"? *R. Newbouldii* (cit. Babingt.) Rogers *l. c.* 66.

"*R. Bloxamianus* Colem. ex Rogers *l. c.* 66.

"*R. regillus* A. Ley Journ. Bot. 1896 p. 217; Rogers *l. c.* 67.

"Omnes hæ plantæ accuratius vivæ et in locis natalibus examinandæ sunt."

But after many years' study of these plants, living and dried, I am confirmed in my conviction that all of them, except my var. *nudicaulis*, are really best placed where they are found in my *Handbook* and in *London Catalogue*, ed. x., among (not *Egregii* but) *Eu-Radulæ*. As for my *nudicaulis*—an abundant and very constant plant throughout S. Dorset and S. Hants, and reaching I. Wight and S. Wilts—there seems no room for doubt that its closest relation is to *R. mucronatus*, though it keeps quite distinct from that type.

Next we find, on p. 190, as an example of "Formæ et prospecies *R. mucronato* affines":—

"*R. Briggsii* Blox. in Journ. Bot. vii. p. 33 (1869) *teste* Archer Briggs Fl. Plymouth p. 125, qui *R. Briggsii* varietatem *R. fusco-atri* (ex sensu Briggsii) esse dicit. *R. fusco-ater* (cit. Weihe), Briggs Fl. Plym. p. 124. *R. oigocladus* (cit. P. J. Muell. et Lefvre?) Rogers Handb. Brit. Rub. p. 65."

This seems a wholly unsatisfactory arrangement. We clearly cannot accept *R. Briggsii* as the name for our widely distributed and locally common plant, the "*R. oigocladus* Muell. & Lefv. ?" of my *Handbook* and of *London Catalogue*, ed. x. Dr. Focke's explanation is as follows:—"Bloxamii *R. fusco-ater* (secund. specim. exsicc.) planta erat *R. fusco-atri* Weihei similis. Jure igitur auctor *R. fusco-atrum* Briggsii nomine novo salutavit. Briggsius specimen a Bloxamio nominatum a suo (falso) *R. fusco-atro* distinguere conatus est et demum sub titulo levis varietatis segregavit. Bloxamius vero non unicum specimen sed integram speciem nominare voluit." But in Fl. Plym. p. 124, Briggs gives "b. *Briggsii*" as a "very rare" "variety" of his "*R. fusco-ater* Weihe," and states definitely that whereas "Bloxam maintained that it was a distinct species" he "preferred to consider it a variety of *R. fusco-ater*, as does Professor Babington." I may add that Briggs left me all his *Rubus* specimens, and that I still have all his *Briggsii* sheets. He told me in later years that he found it apparently dying out, and so was disposed to regard it as "possibly a quite abnormal form." To me it has looked like a cæsian hybrid, and for that reason I have omitted it from my *Handbook* and from successive editions of the *London Catalogue*. His "*fusco-ater*" ("*R. oigocladus* ?" of *Handbook* and *London Catalogue*) is certainly a very different looking plant, and is not only locally abundant in England but also extends to Ireland, and in a modified form to the Channel Islands. It was Dr. Focke who first suggested the name "*R. oigocladus*" for it as "probably right," and to that view he held for several years. If he is right, as he probably is, in now declining to accept our plant as M. & L.'s *R. oigocladus*, it should, I suppose, either remain in our list for the present as "*R. oigocladus* Rogers (non M. & L.)," or be altogether omitted until a more satisfactory conclusion is reached. There seems to me no room for doubt that I have rightly placed it among *Eu-Radulæ*, where *R. Briggsii* could hardly be put.

Dr. Focke's recent treatment of *R. anglosaxonicus* Gelert and *R. uncinatus* P. J. Muell. was referred to at some length in Journ. Bot. 1905, pp. 76, 77, 203, and in their case little need be added here. He still holds that *R. anglosaxonicus* may come under *R. apiculatus* Wh. & N.; but he adds (p. 231) the following notes:—"Species potius collectiva quam limitibus definita videtur, sed quamvis planta valde variabilis sit, specimina typica e terris longe distantibus sæpe inter se optime congruunt. Præter hanc formam satis constantem Rogers *l. c.* distinguit varietates: *curvidens* A. Ley, *vestitiformis* et *raduloides*. Speciei notas atque limites bene exposuit O. Gelert *l. c.* sub *R. anglosaxonico*. Haud raro vero difficile est specimina sicca a *R. radulâ* et *acanthode* distinguere." *R. melanoxylon* Muell. & Wirtg. This name, given us in the first instance by Dr. Focke (*vide* Journ. Bot. 1897, p. 47) for a plant widely distributed in Scotland, and occurring in several Welsh and English counties, is now (*Rubi Europæi*, p. 216) withdrawn by him as incorrect, and "*R. furvicolor* Focke nov. nom." substituted for it, with a short description and the statement that it is "like *R. melanoxylon*, but differs in its concolorous leaflets." None but British localities are given for it.

When we come to the *Eu-Radulæ*—*i. e.* to the *Radulæ* as strictly and rather narrowly limited in my *Handbook* (p. 5)—we find substantial agreement with our names. But a place is found for my subsp. *anglicanus* under *R. macrostachys* P. J. Muell., as a near ally of *R. radula*—an arrangement for it with which I have no quarrel, though on the whole I still prefer a closer association of it with *R. radula* itself, together with *echinatoides*, my other subsp. under the species *radula*, now left so by Dr. Focke as "var. vel ex Rogers subsp." Both these plants, easily recognized and very widely distributed in England and Ireland, are quite obviously less distinctly eu-radulan than *R. radula* itself, but they seem most helpfully placed in the closest possible relation to it, as the alliance is such that at first they were not distinguished from it.

As regards the plants which make up our groups *Sub-Koehleriani* and *Sub-Bellardiani*, Dr. Focke's treatment of them hardly calls for comment here except perhaps in two instances—*phyllothyrsus* and *cavatifolius*. Of var. *phyllothyrsus* (Frider.)—under *R. Babingtonii* Bell Salt.—he now writes: "*R. phyllothyrsus* Friderichsen, quem Rogers varietatis titulo sub *R. Babingtonii* describit, ex meâ sententiâ nil nisi *R. chlorothyrsus* est. Planta anglica sic nominata parum a *R. Babingtonii* differre videtur." It evidently must not be concluded from this that in Dr. Focke's opinion his *R. chlorothyrsus* is a near ally of our *R. Babingtonii*, seeing that he describes them in different groups, with fifty-six pages between them; but his contention is that I have been mistaken in applying Friderichsen's name to our plant, which he regards as only a variety of *R. Babingtonii*. I now agree with him in this. In spite of a very remarkable general resemblance, the two plants are so widely different in glandular and acicular development that they must be assigned to different groups — Friderichsen's remaining where Focke places his *R. chlorothyrsus*, among the *Silvatici* and immediately after *R. silvaticus*, while the right place for our plant is among the *Sub-Koehleriani* and near *R. Babingtonii*. It should perhaps be added that the mistake, only now detected, was due to the fact that Mr. Friderichsen's friend, the late Mr. O. Gelert, when staying with me in 1897, the year after the publication of *R. phyllothyrsus*, gave that name to our plant without hesitation, in spite of the difference in glandular development observed at the time. Since then I have from time to time placed with it a considerable number of plants from Surrey and other counties, none of which can rightly claim a place among *Silvatici*. The name *phyllothyrsus* must, therefore, be removed from our list. It seems equally clear that *R. festivus* Muell. & Wirtg. should be restored to it (*vide* Journ. Bot. 1893, p. 45). It might be placed next after *R. Babingtonii*, though not as a variety of it, and include several of the plants hitherto named *phyllothyrsus*. In *Rubi Europæi* it is given as "species conjungens collectiva," and under "var. *eu-festivus*" we find Mr. Ley's Dinmore Woods (Heref.) plant (No. 95, *Set of British Rubi*) quoted for it. Perhaps a provisional place should also be found, among the *Silvatici*, for *R. chlorothyrsus* Focke, in agreement with the note under that name on p. 177 of *Rubi Europæi*: "In Britanniâ vidi formam foliolis subtus cano-virentibus distinctam (legit W. R. Linton in Derbyshire) quam præterea exsiccatam a *R. chlorothyrso* separare non possum."

Our *R. cavatifolius* P. J. Muell., which Dr. Focke apparently accepts as Mueller's plant, he now places under *R. pallidus* Wh. & N. as "forma luxurians densiflora et latifolia"; but it seems decidedly nearer to our *R. Babingtonii*, and (as I have seen it in fair quantity in Herefordshire and Monmouthshire and from two localities in W. Gloucester) clearly and constantly distinct from both.

On reaching the last three groups in our list, including all, or nearly all, the Rubi with very mixed armature, the difficulty of comparison with the concluding pages of *Rubi Europæi* is seriously increased. This special difficulty arises partly from the greater range of variation, which appears to be a general feature of the more glandular Rubi, and partly from the circumstance that these highly glandular Rubi with very mixed armature are, as a rule, much more thinly distributed than the members of the earlier groups—in Britain at all events, and probably in most parts of the Continent also. On these plants, therefore, I propose adding only a few brief notes of a more general character.

Thus, if we consider them in the order in which they stand in our *London Catalogue*, ed. x., it may be said in general terms:—

1. The following species are now recognised as common to Great Britain and the continent of Europe:—*R. rosaceus* Wh. & N., *R. hystrix* Wh. & N., *R. Koehleri* Wh. & N., *R. viridis* Kalt. (sensu ampliss.), *R. Bellardii* Wh. & N., *R. hirtus* Waldst. & Kit. (sp. collect.), *R. dumetorum* Wh. & N. (sp. collect.), *R. diversifolius* Lindl. (a species in *Rubi Europæi*, but a var. in *London Catalogue*, ed. x.), *R. corylifolius* Sm., *R. Balfourianus* Blox., *R. cæsius* Linn. These all are strongly marked plants, and may be regarded as somewhat widely distributed here and on the Continent.

2. Less strongly marked; as a rule less widely distributed, and therefore somewhat more open to doubt as to their identity here and on the Continent, and perhaps partly on that account not reported for Britain in *Rubi Europæi*, though probably correctly included in our list, are the following:—*R. adornatus* P. J. Muell., *R. horridicaulis* P. J. Muell., *R. hostilis* Muell. & Wirtg., *R. fusco-ater* Weihe, *R. divexiramus* P. J. Muell., *R. serpens* Weihe, *R. Kaltenbachii* Metsch., *R. minutiflorus* Wirtg. (or P. J. Muell. ?), *R. saxicolus* P. J. Muell., *R. tereticaulis* P. J. Muell., *R. cyclophyllus* Lindeb. All these names (except perhaps *R. cyclophyllus*, which was first suggested as British by Babington) have from time to time, and mostly more than once, been given to British plants by Dr. Focke, though there seems no evidence in *Rubi Europæi* that he would still so apply them. As regards *cyclophyllus*, we have followed Babington in substituting this name for his *conjungens*, to be used in an aggregate sense for forms of *R. corylifolius* Sm. other than the type ("a. *sublustris* Lees" of *London Catalogue*, ed. x.). As however, there seems to be considerable uncertainty about the right use of Lindeberg's name, it may be wise to substitute *conjungens* Bab. as is done in *Rubi Europæi*.

3. British plants for which names different from those in our list are preferred in *Rubi Europæi*:—*R. plinthostylus* Genev., *R. Marshalli* Focke & Rogers and its "b. *semiglaber* Rogers," *R. acutifrons* Ley. Brief notes on these may be found of interest.

R. plinthostylus Genev. is given in *Rubi Europæi* as a synonym of *R. Reuteri* E. Merc., but our plant, apparently known only from our descriptions, is not accepted as certainly the same. Our *R. Marshalli* Focke & Rogers is placed as "var. *Marshallii* Focke & Rogers" under *R. pilocarpus* Gremli, together with our very variable var. *semiglaber*. On this Mr. Marshall's translation (Journ. Bot. 1905, p. 77) of Dr. Focke's remarks in Aschers. & Graebn. (1902–3) may be consulted. Apparently our very remarkable type has not yet been found on the Continent. As to the treatment of *R. acutifrons* Ley, reference may be allowed to p. 204 of the same volume of this Journal, where reasons are given for hesitation in accepting the proposed substitution of *R. humifusus* Wh. & N. for Ley's name. Ley's var. *amplifrons* (Journ. Bot. 1902, p. 69), though a very strongly marked form, does not seem to be noticed in *Rubi Europæi*.

4. Described in *Rubi Europæi* as British, but not as yet detected elsewhere in Europe:—*R. Purchasianus* Rogers, *R. cognatus* N. E. Brown, *R. dasyphyllus* Rogers, *R. ochrodermis* Ley. *R. cognatus* has a distinct place and brief description in *Rubi Europæi*, but is held to be very like the Scandinavian *R. horridus* Hartm. *R. dasyphyllus* is very briefly and inadequately described by Dr. Focke, and as British only; but in 1912 I received excellent specimens of it collected by Mr. Friderichsen "in woods, Tolne, Denmark," in that year. Apparently otherwise still unknown on the Continent, though exceedingly abundant in Great Britain and frequent in Ireland.

5. British plants included in *London Catalogue*, ed. x., but apparently not mentioned in *Rubi Europæi*:—*R. Powellii* Rogers, *R. Durotrigum* R. P. Murr., *R. rotundifolius* Bab., *R. Bucknalli* J. W. White.

6. British plants recently published, but not included either in *London Catalogue*, ed. x., or in *Rubi Europæi*:—*R. lacustris* Rogers, in Journ. Bot. 1907, pp. 9, 10, *R. glareosus* Rogers & Marshall, in Journ. Bot. 1912, pp. 309, 374.

AZOLLA IN BRITAIN AND IN EUROPE.

By A. S. Marsh, B.A.

[Reprinted by permission from the *Proceedings of the Cambridge Philosophical Society*, vol. xvii. part 5 (May 5, 1914).]

In the middle of October 1913 a species of Azolla was found in Jesus Ditch, Cambridge, by Mr. H. Jeffreys, of St. John's College. Mr. Moss called my attention to the fact, and at his suggestion and with his frequent kind assistance I have identified the species and collected a few notes on the distribution of plants of this genus in Europe generally and the British Isles in particular.

The Cambridge plant I found to be *Azolla filiculoides* Lam. It was growing among the *Lemna*, but two or three large patches, several metres broad, bore Azolla almost pure, the dull brownish colour of the plant as seen in large masses showing up markedly against the bright green of the duckweed. When first found the plants seemed to be without reproductive organs, but on November 2nd it was bearing micro- and macro-sporocarps in some quantity. On November 26th, after several sharp frosts, the Azolla was growing vigorously, still with sporocarps, and had spread over larger areas, at the eastern end of the ditch becoming the dominant species of the aquatic vegetation. At the present time (February 9th) it is very abundant, but very red in colour and broken up into small pieces.

As to means of introduction of this fern into Cambridge we are completely ignorant. The nearest of the previously recorded stations is the Norfolk Broads area, while the obvious suggestion, that we are dealing with a Botanic Garden escape, is untenable, since there was before this discovery no Azolla except *A. caroliniana* being grown at the Cambridge Botanic Garden.

Azolla, according to Baker,[*] is a genus with five species inhabiting the tropics and warm temperate regions of both hemispheres. Of these species two have been introduced into Europe, and both occur in the British Isles. These two are *A. caroliniana*, which occurs native in America from Lake Ontario to Brazil, and *A. filiculoides*, from South America.[†]

The characters of these two species have been well summed up in two recent papers on the occurrence of *A. filiculoides* in Europe, and from the accounts of these authors (*viz.* Bernard[‡] and Béguinot and Traverso[§]), from Baker[||] and from von Martius,[¶] the following details of the principal differences between the species are taken.

Azolla filiculoides (Lamarck, *Encyclopédie Méthodique: Botanique*, T. i. p. 343 and plate 863, 1783). The plants are in dense tufted masses, the ends of the shoots being porrect and often protruding, not lying flat on the surface of the water as in the other species. The whole shoot is much larger and thicker, the branching is more compound and the branches are closer together. The upper lobes of the leaves have a broad distinct margin, and bear numerous unicellular trichomes on their upper surfaces. The reproductive organs show the most distinctive characters. The *glochidia* or hooked hairs which are attached to the *massulæ* or microspore masses have non-septate stalks. The macrospore wall is furnished with large, deep, circular pits.

Azolla caroliniana (Willdenow, *Species Plantarum*, v. p. 541, 1810). The plants are much smaller with much less dense branching. They lie flat on the surface of the water. The roots are not as numerous or as conspicuous as in *A. filiculoides*. The margin of the upper leaf lobe is not as broad as in the other species, and the trichomes of the upper surface are said to be bicellular, though I have not been able to observe this character satisfactorily. The *glochidia* have 3–5 transverse septa in the stalk, and the macrospore wall is not pitted but merely finely granulate.

---

[*] Baker, *Fern Allies*, p. 137, London, 1887.

[†] The distributions are as given in Coste, *Flore de France*, iii. pp. 702, 703, Paris, 1906, and Ascherson u. Graebner, *Synopsis der mitteleuropäischen Flora*, i. p. 114, Leipzig, 1896.

[‡] Bernard, *Recueil des Trav. Bot. Néerland.*, i. pp. 1–14, 1904, quoted in the *Report of the Botanical Exchange Club for* 1912, p. 186.

[§] Béguinot e Traverso, "*Azolla filiculoides* Lam. nuovo inquilino della flora italiana," *Bull. Soc. Bot. Ital.*, pp. 143–151, 1906.

[||] Baker, *loc. cit.*

[¶] von Martius, *Flora Brasiliensis*, vol. i. part ii. p. 657, plate 82, Leipzig, 1884.

The history of the genus in Europe began in 1872, when *A. caroliniana* was introduced into Continental botanic gardens, whence it soon escaped into neighbouring ditches and ponds, and multiplied enormously. In 1878 De Bary described it as a "new water-pest" in Kassel, and in 1885 it was very abundant at Leyden and Boskoop in Holland.[*] It was also found at Bonn, Giessen[†] and Strassburg in 1885, and in Berlin in 1887.[‡] In Bohemia it was found by Čelakovský near Pilsen in 1895, and it had spread much earlier into England (1883), France (1879), and Italy (1886).[§]

In England *A. caroliniana* was first obtained at Pindon (Middlesex), and an account of this is published in *Science Gossip* for 1883. It has been recently reported from various spots in the Thames valley, between Oxford and London, but it must be remembered that until Ostenfeld[||] pointed out the fact in 1912 (from specimens found in 1911) it was not realised that we had any Azolla other than *A. caroliniana*. For instance, Druce[¶] (1908) gives only one species, *A. caroliniana*. The following records for the British Isles have been published, though, until the material has been re-examined in the light of Ostenfeld's discovery, they must be considered records for the genus rather than for the species. Azolla described as *A. caroliniana* has been found at Hayes Place (Kent), Oxford, Sonning, Henley, Enfield, Sunbury and Suleham.[**] Of these I have been able to examine material from Sunbury and Enfield kindly sent by Mr. C. E. Britton. The Sunbury plant is *A. filiculoides*, the Enfield specimen *A. caroliniana*. Another Azolla from Enfield was sent by Mr. Holloway, but this was *A. filiculoides*. The Norfolk Azolla, which is good *A. filiculoides*, has also been several times referred to as *A. caroliniana*. I have seen *A. caroliniana* from one other British locality, *viz.* Godalming, where it was found in 1913.

The species is described by Ascherson and Graebner (1896) as fruiting only very rarely, they knowing of only one case of fruit being produced in Europe—a record from Bordeaux. No fruiting material has been found in the British Isles, although fruiting *A. filiculoides* has more than once been described under the wrong specific name.

---

[*] Kittel, *Gartenflora*, 1885.

[†] Dosch u. Scriba, *Excursionsflora Hessen*, 3te Auflage, p. 24.

[‡] Luerssen, *Farnpflanzen*, p. 598.

[§] This account is taken chiefly from Ascherson and Graebner, *loc. cit.*, but see also Saccardo, *Cronologia della Flora Italiana*, Padova, 1909; *Ibid.*, "De diffusione Azollæ carolinianæ per Europam," *Hedwigia*, 1892, p. 217; Béguinot and Traverso, *loc. cit.*, where many additional references are given.

[||] Ostenfeld, "Floristic Results of the International Excursion," *New Phyt.* xi. p. 127, 1912.

[¶] Druce, *List of British Plants*, p. 88, Oxford, 1908.

[**] *Reports of the Botanical Exchange Club*, 1910, p. 609; 1911, p. 56; 1912, pp. 186, 220; *Journal of Botany*, xl. p. 113, 1902; xlviii. p. 332, 1910.

Azolla filiculoides was introduced into Europe in 1880 by Roze,[*] who naïvely remarks, "Le climat de Bordeaux paraît, du reste, assez bien convenir à ces deux espèces américaines, car quelques poignées de la première [*A. caroliniana*] en 1879, et de la seconde [*A. filiculoides*] en 1880, jetées çà et là dans les fossés des marais de cette ville, ont donné naissance à une légion innombrable de ces plantes, qui ont envahi presque tous les fossés, mares et étangs du département de la Gironde."

It spread over many parts of France and then into other countries. In 1896 Ascherson and Graebner knew of it only in western and northern France. In 1900 it had reached Italy.[†] In the British Isles *A. filiculoides* was first noticed as a distinct species by Ostenfeld[‡] in 1911, who found it at Woodbastwick, Norfolk, and at Queenstown Junction, Co. Cork. It was, however, present in this country before that time. The Sunbury record of *A. caroliniana* in 1910[§] should certainly be ascribed to the other species, while the Azolla was noticed in the Norfolk Broads[||] before Ostenfeld's identification.

I have also seen fruiting specimens of *A. filiculoides* found in 1912 at Almondsbury, West Gloucestershire, and kindly sent me by Miss I. M. Roper. The same species now occurs at Reading, where it is peculiar in being without the endophytic blue-green alga, *Anabæna*, which usually inhabits the cavity of the upper leaf-lobe.

At present *A. filiculoides* seems to be growing in importance as a constituent of British vegetation, for, as the result of the floods of 1912, it has been distributed over large areas in Norfolk. It is described as occupying a definite position as a member of the association of *Typha angustifolia*, especially in South Walsham and Ranworth Broads.[¶]

A. filiculoides fruits quite readily in Europe. Both the specimens found by Ostenfeld were fruiting, the Almondsbury and the Sunbury plants were in fruit, and I obtained fruit last autumn, not only from Cambridge, but, by the kindness of Mr. W. E. Palmer, of St. John's College (the author of the article in *Nature*), also from Norfolk. Ascherson and Graebner[**] also describe it as a freely fruiting species.

---

[*] Roze, "Contribution à l'étude de la fécondation chez les Azolla," *Bull. de la Soc. bot. de France*, xxx. p. 198, 1883.

[†] Saccardo, *Cronologia*, *loc. cit.*; Béguinot e Traverso, *loc. cit.*

[‡] Ostenfeld, *loc. cit.*; *Report of the Bot. Exch. Club for* 1912, pp. 220, 301.

[§] *Rep. Bot. Exch. Club for* 1910, p. 609; *Journ. Bot.* xlviii. p. 332, 1910.

[||] *Rep. Bot. Exch. Club for* 1910 *and* 1911, *loc. cit.*

[¶] Palmer, "Azolla in Norfolk," *Nature*, xcii. p. 233, 1913. The plant is wrongly named *A. caroliniana*, but I have seen fruiting specimens, which prove it to be *A. filiculoides*.

[**] *Loc. cit.*, p. 115.

In conclusion, I should like to suggest that it is of some importance to keep a look-out for Azollas in the British Isles, as in the event of their becoming important factors in our vegetation, as full a knowledge as possible of their early history in the country would be of great interest and value.

NOTES ON THE MANX FLORA.

By J. W. Hartley and J. A. Wheldon, F.L.S.

Whilst engaged in making a lichenological survey of the Isle of Man, early in June of the present year, we noticed a few flowering plants, some of which may prove to be new to vice-county 71, or at least from new stations. But there is great need of a revision of Manx plants, and it is hoped that a general botanical survey of the Island may be undertaken shortly. The most recent lists of species that we are aware of are the Rev. S. A. P. Kermode's "List of Flowering Plants," reprinted from *Yn Lioar Manninagh*, vol. iii., in 1900; and the "Flora of the Manx Curraghs," by one of us, which appeared in the *Lancashire Naturalist*, 1910, pp. 271–274 and 301–304. Mr. Kermode's list does not include the *Gramineæ* or *Cyperaceæ*, and specific localities are only quoted for the rarer species. Lists of Grasses and Ferns have, however, appeared in local publications, and in 1889 the Rev. S. Gasking contributed to *Research* a catalogue of Manx plants without localities, which included the Grasses, Sedges, and higher Cryptogams.

Cheiranthus Cheiri L. On walls, Rushen Abbey.

Cochlearia danica L. Shore near Glen Maye.

Reseda Luteola L. Copse near Jurby.

Viola ericetorum Schrad. Heathy ground near Blue Point.

Polygala oxyptera Reichb. Sand dunes about Jurby and Blue Point.

Cerastium vulgatum L. North of Peel.

C. viscosum L. Shore near Blue Point.

C. tetrandrum Curt. Scattered, with *C. semidecandrum* L., on the dunes from Jurby to Blue Point.

Arenaria serpyllifolia L. var. *macrocarpa* Lloyd. With the preceding species.

Spergularia rupestris Lebel. Peel; and very fine on rocks on the Glen Maye shore.

Sagina ciliata Fr. Sparingly near Point of Ayre.

Erodium cicutarium L'Hérit. var. *glutinosum* Clav., and *E. maritimum* L'Hérit. On the dunes near Lhane.

Ononis maritima Dum. (*O. repens* L. var. *prostrata* Bréb.). A very glutinous prostrate form at Jurby and near Point of Ayre.

Lotus corniculatus L. var. *crassifolius* Pers. Shore near Blue Point.

Rosa spinosissima L. Dunes near Lhane. A taller state is frequent on hedge-banks about Jurby and Blue Point.

Sedum anglicum Huds. Abundant on the dunes of the north, where it seems to replace *S. acre*, which was not seen.

Smyrnium Olusatrum L. Ballasalla, Jurby, Lhane, &c., very frequent, and nearly always affected by *Puccinia*.

Anthriscus vulgaris Bernh. Lhane and Jurby.

Galium verum L. var. *maritimum* DC. Sand-dunes near Lhane.

Valerianella olitoria Poll. Common on the sand-dunes from Jurby towards Point of Ayre.

Dipsacus sylvestris Huds. Seen between Glen Cam and Jurby, but the locality was not noted. We find, however, that it is not included in Mr. Kermode's list.

Petasites fragrans Presl. Bishop's Court Glen; no doubt planted.

Cnicus arvensis Hoffm. var. *vestitus* Koch. Near St. Germans.

Taraxacum lævigatum DC. Sand-dunes near Lhane.

Jasione montana L. A small form with prostrate stems, and anthodes as small as those of var. *littoralis* Fr., but with hairy leaves, occurs on the dunes near Jurby and Lhane.

Euphrasia curta Wettst. A very dwarf form on the dunes at Lhane.

Salix aurita L. and *S. lutescens* Kern. Glen Rushen.

Polygonum Raii Bab. Near Blue Point. (Recorded as *P. Roberti* Lois. in *Lancs. Naturalist*, 1910, p. 304.)

Scilla verna Huds. Very fine on the coast about Glen Maye.

Carex arenaria L. Common on the dunes about Jurby and Lhane.

C. flava L. Boggy fields near St. Germans.

Phleum arenarium L. Plentiful at Blue Point and Lhane.

Ammophila arenaria Link. Sand-dunes from Jurby onwards to Point of Ayre.

Aira caryophyllea L. and *A. præcox* L. Both abundant in the north of the Island, on sand-dunes and hedge-cops.

Trisetum flavescens Beauv. Glen Maye.

Festuca rigida Kunth. Peel Castle.

F. rottboellioides Kunth. Rocks on the shore near Glen Maye.

Bromus hordeaceus L. var. *leptostachys* Beck. Dunes near Jurby.

Botrychium Lunaria Sw. Amongst *Pteris*, on the dunes near Blue Point.

ARMERIA ARCTICA Wallr. FOSSIL IN BRITAIN.

By Clement Reid, F.R.S.

Among some fruits associated with *Salix polaris* in a deposit belonging to the Glacial Period, discovered at Borna, south of Leipzig, Dr. C. A. Weber has recently found and figured *Armeria arctica* Wallr., a species supposed to be confined to Arctic North America and Greenland. He, however, found the same plant in the herbarium at Stockholm, among specimens from Siberia, where it had not previously been recorded. He also again recognized it, among plants wrongly determined, from the glacial deposits of Denmark and perhaps Galicia.*

Armeria arctica is therefore circumpolar, and it had formerly a wide extension southward.

Dr. Weber's figures and description made me re-examine some unknown fruits which I had obtained at various times from British glacial deposits, but could not determine; they certainly did not belong to *A. maritima*, and the American *A. arctica* was not in my collection. Comparison leaves no doubt that this circumpolar species was common also over the lowlands of Britain during the Glacial Epoch. I have fruits of it from the base of the boulder clay at Mundesley, on the Norfolk coast (associated with *Salix polaris* and *Betula nana*); from the top of the glacial deposits at Saughton and Corstorphine, close to Edinburgh (associated with *S. polaris*, *S. herbacea*, *S. reticulata*); and from material collected by Messrs. E. T. Newton and S. H. Warren at Ponder's End, in the Lea Valley, where also it is associated with *Salix herbacea* and *Betula nana*.

As this Arctic species was formerly so widely distributed over the lowlands of Europe, the living mountain forms of *Armeria* in Britain should now be re-examined critically, for it is probable that they will be found to belong to this species, or to one of the allied Arctic species, and not to the sea-coast *A. maritima*. As distinguished from *A. maritima* the fruiting calyx of *A. arctica* is more robust, shorter, broader, much more openly campanulate, and is densely pilose on the ribs but smooth on the intervals. All these characters are well seen in the fossils, though some of the specimens, as we should expect, have lost the hairs. The smooth intervals at once separate *A. arctica* as belonging to a different section of the genus from that in which *A. maritima* is placed.† The fruiting calyx gives the best specific characters in this genus.

A NEW SPECIES OF DISCINELLA.

By J. Ramsbottom.

The genus *Discinella* was founded by Boudier in his "Nouvelle classification naturelle des Discomycètes charnus," in Bull. Soc. Myc. Fr. 1885, i. p. 112. There is no Latin description, but the generic characters can be easily understood from the information supplied in the key to the genera, and from the fact that *Phialea Boudieri* Quél. is made the type species. The characters are more fully given by the same author in his *Histoire et Classification des Discomycètes d'Europe* (1907). According to Boudier the principal characters are the terrestrial habit and the size of the fungus, which can reach as much as 12 mm. The species are thick, shortly stipitate, having somewhat the appearance of operculate species, though they are inoperculate. The hymenium is more or less surrounded by a dentate margin. The exterior of the receptacle is subtomentose. The inoperculate asci are remarkably small, eight-spored, with a marginate pore. The paraphyses, which are fairly slender, are filled with oil globules, united sometimes into masses. The spores are fusiform and contain oil drops, which are accompanied or not by granulations. (The genus *Discinella* of Karsten (*Hedwigia*, 1891, 30, p. 301) is different from Boudier's genus: "est *Discina* Fr. em. apotheciis minoribus," and the species described, *D. corticalis*, is not terrestrial.)

---

* *Die Mammutflora von Borna*, Abh. Nat. Ver. Bremen, 1914, Bd. xxiii. Heft 1.

† See Boissier in De Candolle, *Prodromus Systematis Naturalis Regni Vegetabilis*, pars xii., 1848.

The species of *Discinella* which have been recorded in this country are *D. purpurascens* (Pers.) Boud., *D. exidiiformis* (B. et Br.) Boud., and *D. Menziesii* Boud. The last-named species was described and figured in Trans. Brit. Mycol. Soc. 1913, iv. p. 62, as *Calycella Menziesii*, from specimens sent from Perth by Mr. J. Menzies. Boudier, in the same publication, 1914, p. 323, places the species in the correct genus. At the end of last year Mr. D. Garnett found this fungus at Silchester, growing amongst moss and usually under *Ulex*, and brought it to me for identification. As the fungus appeared suitable for cytological investigation, several collections were obtained, and an attempt was made to find young stages. In the search numerous very small bodies were met with which, on examination, proved to be mature apothecia. These specimens were kindly brought to me for examination, Mr. Garnett fully realizing the close similarity these fructifications had to those of *D. Menziesii*. The fungus is apparently new, and is distinguished from its allies by the exceptionally small size of the apothecia. It would be included by Saccardo in the genus *Humaria*.

Discinella minutissima Ramsb. et Garn.—Minutissima substipitata, isabellina, 300–400 μ lata, carnosa, crassa, margine non prominulo, obtuso; stipite obconico, crasso; paraphysibus tenuibus, 2-3 μ crassis, oleosis, simplicibus, filiformibus, ad apices non aut vix incrassatis, hyalinis; ascis inoperculatis minoribus octosporis, foramine marginato, cylindrico-clavatis, 40–50 μ × 4–5 μ, ad basim vix attenuatis, ad apicem iodo non cærulescentibus; sporidiis oblongo-fusiformibus, hyalinis, levibus, continuis, sæpe leniter curvatis, 7–8 μ × 2 μ, intus guttulosis et granulosis, guttulis sæpius 3 majoribus, granulis minoribus.

Ad terram argillosam in Silchester, Hants, April 22, 1914.

SHORT NOTES.

Romulea parviflora (p. 46).—Dr. Stapf calls my attention to the publication of this name in Bubani's *Flora Pyrenæa*, iv. 150 (1901). Judging from the synonymy, this is identical with Salisbury's *Ixia parviflora*, and the name must therefore be cited as of Bubani. It is curious to note that Bubani does not cite Salisbury's publication, of which he was probably not aware; he based his name on "*I. parviflora* Pourr. Herbr. Matr.," to which he adds "ita ego."—James Britten.

Apera interrupta Beauv. in Lancashire. — Mr. J. A. Wheldon and I found this rare grass at Freshfield, South Lancashire, v.-c. 59, early in July. The plant occurred on sandy and cindery soil for some distance along the margin of the road leading from the station to the shore. The specimens were numerous and well-grown. No other "alien" plants were seen in the vicinity, but there can be no doubt that the plant in this locality is purely a casual, as to the origin of which we can make no suggestion. There is no record to our knowledge of this species ever having been met with in Lancashire before, although its congener *Apera Spica-venti* occasionally crops up about docks, canals, and railways; and as there is a possibility that it may establish itself on the open sandy soil of the district, it may be well to put particulars of our "find" on record.—W. G. Travis.

Miller's 'Abridgement,' ed. 4.—As there seems to be some obscurity about the "discovery" of the fourth edition of the *Abridgement* (1754) of Miller's *Gardeners Dictionary*, I may point out that I was the first to call attention to it as an authority for the citation of genera, in Journ. Bot. 1910, p. 183, and again in Prodr. Fl. Brit. p. 461 (February, 1911). The many binomials to be found in it are, of course, only accidental and are not valid for citation; and have even less claim to notice than similar "accidentals" in Hill's *British Herbal* and in Gersault's *List*, which are both of later date. As it has been suggested that this work of Miller may be ignored by decision of Congressional vote on the principle of the "nomina conservanda" anomaly, I should protest that it can be no more suppressed than the classical but badly printed *Species Plantarum* of the previous year.—F. N. Williams.

REVIEWS.

Physiological Plant Anatomy. By Dr. G. Haberlandt. Translated from the fourth German edition by Montagu Drummond. 777 pages, with 291 figures in the text. Macmillan & Co., Ltd. 1914. 25*s*. net.

The relation of an organism to its environment is one of the most interesting of all biological problems if, indeed, it cannot be said to comprise the whole of biology. The "hand and eye" characters of plants, the various macroscopic adaptational devices which they display, must at times appeal to all botanists. For those who are fortunate enough to have had a training in microscopic manipulation there is something further—the possibility of the attempt to correlate the internal anatomy of plants with their life-processes and with their surroundings. The study of plant anatomy as such is of purely academic interest. It is only to a certain type of mind or, in any case, only to a trained anatomist, that the various forms of "woody fibre" and their position in the plant can appeal. The older observers in anatomy and physiology certainly realized the functions of many types of plant tissue. Anatomy and physiology were, however, kept distinct. An epoch-making paper by Schwendener—"Das mechanische Prinzip im anatomischen Bau der Monocotylen"—was published in 1874, in which the skeleton of the plant and the structure and relation of this "mechanical" system were correlated with function in a very convincing manner. Every examination student is now taught the essence of Schwendener's principles but, probably because no controversy was aroused, Schwendener's name is not so often attached to them as it is to that suggestion of his which revolutionized the study of lichens. Many of Schwendener's pupils adopted the anatomico-physiological attitude, and in 1884, Haberlandt (who has succeeded Schwendener as Professor of Botany in Berlin) published the first edition of his famous *Physiologische Pflanzenanatomie.* The book under review is a translation of the fourth edition of this work. "In its present form, therefore, this work may be assumed to embody the mature and considered views of its author, with regard to that section of botanical science which he has made peculiarly his own." It is therefore more satisfactory to have a careful translation of this work than a book which is merely a compilation. The volume opens with an introduction of thirteen pages, in which the author defines the aim of his book and attempts to refute certain philosophical objections to parts of the study:—"The object of Physiological Plant Anatomy is twofold. It consists, first, in the recognition of the physiological functions pertaining to the tissues of the plant and to the structural units, or cells, of which these tissues are composed; and, secondly, in the discovery of the connection that exists between the several functions and the anatomical arrangements required for their proper performance." There is also a discussion concerning "functionless" cells which "play no useful part in the general economy of the plant." This seems rather too definite; on the other hand, we should be inclined to doubt whether some of the functions bestowed upon certain cells have any real existence. If a function cannot be assigned to a tissue at present, it seems as illogical to assume that no function exists as it does to hold that the functions assigned are in all other cases the correct ones. "The value of teleological explanation depends entirely upon the philosophical attitude of its author" we are told, and in some cases the attitude of the present author is apparent.

There are fourteen chapters:—The cells and tissues of plants, meristematic tissues, dermal, mechanical, absorbing, photosynthetic, vascular, storage, aërating, secretory and excretory, motor, sensory and stimulus-transmitting systems, and a concluding chapter on secondary growth. Each of these chapters is subdivided into convenient portions.

The translator's part of the work seems to be well and carefully done. Owing to the adoption of a somewhat free translation, the book hardly reads as if it were translated. The time that has elapsed since the fourth German edition (1909) appears rather long, and meanwhile certain portions of the study, for instance, those on light perception, have been somewhat extended. The recent results have not been incorporated by Mr. Drummond, we think advisedly. The only additions made are indicated by square brackets and seem to consist merely of words added for greater clearness. An innovation is the gathering together of the notes at the end of the book instead of the perhaps more convenient place at the end of each chapter which they occupied in the German editions. There is a subject index and an index of plant names. Botanical students will welcome this book. There are few laboratories which do not possess the original work, but the German language is not, as a rule, read by students with ease. The binding and printing are both excellent and the figures clear. The author is to be congratulated on the completion of his arduous task of making this standard work accessible to many who would not otherwise have been able to read it.

J. Ramsbottom.

Études sur la Flore du Katanga. (*Annales du Musée du Congo Belge, Botanique*, sér. iv. vol. ii. fasc. i.) Par Ém. de Wildeman. Brussels, Sept. 1913.

Dr. de Wildeman continues his researches into the flora of the southernmost province of the Belgian Congo in a Memoir in which a large proportion of the families of Pteridophyta, Monocotyledones and Dicotyledones occurring in that part of Africa find a place. In a work so discursive it is no matter for wonder if some of the author's determinations invite criticism. For instance, the plant named *Geophila herbacea* K. Schum. (*Kassner*, 2427) seems to us to be *G. reniformis* Cham. & Schlecht.; so, too, *Pentanisia variabilis* Harv. is rather *P. Schweinfurthii* Hiern, and *Nuxia platyphylla* Gilg is *N. sambesina* Gilg, while for *Ruellia prætermissa* Lindau, *R. patula* Jacq. should be read, and Kassner's 2908 is certainly not *Brillantaisia patula* T. And., nor is the same collector's 2619 *Barleria salicifolia* S. Moore; moreover, Kassner's 2405 is *Phyllanthus leucanthus* Pax, not as here stated *P. odontadenius* Müll. Arg. Among several oversights we may mention that the plant called *Vernonia Kassneri* De Wild. & Muschler must be renamed, the trivial being already occupied, and the same remark applies to *Ipomœa Kassneri.* The letterpress also is not entirely satisfactory; thus the headings

Myrtaceæ and *Melastomaceæ* have become mutually displaced, and what *Philippia* is doing in the Umbelliferous galley is not evident.

Strong objection must be taken to Dr. de Wildeman's practice of publishing specific names without a reference; thus we find, *inter multa alia*, reference to *Sopubea Kassneri* Pilger "in hb. Berol." for a plant already described, and other determinations similarly authenticated of species still lacking a published description; the names, too, of several of Mr. Edmund Baker's Crotalarias not yet formally published appear here simply with "Baker sp. nov." after them; also we are given no means of distinguishing the younger botanist from his venerable father, who must have been a marvel of precocity if he was already writing, as we are told he was, in Hooker's *London Journal of Botany* seventy-one years ago!

One is sorry to make remarks of this kind concerning a work not without its good points. The many descriptions of new species are written, as is usual with Dr. de Wildeman, in an admirably clear manner, and the photographic plates show up the species more effectively than is often the case with that style of illustration. But there are too many signs of haste throughout the memoir to enable one, after careful examination, honestly to praise it without many reservations.

S. M.

Two Additions to British Local Floras.

A Supplement to the Flora of Somerset. By Edward Shearburn Marshall, M.A., F.L.S. 8vo, cloth, pp. iv. 242. Taunton: Published by the Somersetshire Archæological and Natural History Society. 1914. Price 7*s.* 6*d.*

Flora Orcadensis: containing the Flowering Plants arranged according to the Natural Order by Magnus Spence, *and the Mosses* by Lieut. James Grant. 8vo, cloth, pp. xcv. 148. With Maps and Portraits. Kirkwall: D. Spence. 1914. Price 4*s.*

The extent of Mr. Marshall's *Supplement* to R. P. Murray's *Flora of Somerset* (1893–6) confirms the view always held by the present writer that the estimate of Murray's book published in this Journal for 1897 (p. 150) was somewhat too high—it was a good book, but hardly of "first-rate botanical excellence," falling short as it did of the standard raised by Trimen and Dyer's *Flora of Middlesex* (1869), and maintained by many other works, of which Mr. White's *Flora of Bristol* (1912) is the most recent. The Somersetshire portion of the last-named work has been made full use of in Mr. Marshall's book; indeed, he calls it his "mainstay," an estimate which seems a little over-generous, for the *Supplement* owes its chief value to Mr. Marshall's own notes, and to the greatly extended information regarding the plants of the county and their distribution.

In some respects the *Supplement* is susceptible of improvement. There should have been an introduction in which the principal additions or exclusions, whether of species or of distribution, should have been specified; and it would have been well if the page of the original work had been indicated under each species included therein and appearing in the present work —the number of the species under each genus might, at any rate, have been cited. One would have been glad to have had some biographical matter, which is entirely lacking in Murray's *Flora*; and we think some distinction should have been made between notes—*e.g.* those on *Berberis aristata* and the hybrid *Daphne*—which originally appeared in this Journal, and those which are now first published. Other references might conveniently have been added—*e.g.* to *Plantago Coronopus* var. *sabrina*—and one is a little surprised to find no acknowledgement in the brief preface of the evidently considerable help given by Miss Rivett and Miss Roper.

Turning over the pages, we note much matter of general interest. There are many new localities for *Aconitum*, which Mr. Marshall thinks (and those who have seen the plant *in situ* will agree with him) a true native in Somerset: Dr. Stapf, we are told, has "been unable to meet with exactly our English plant on the Continent." The treatment of *Viola* in accordance with Mrs. Gregory's monograph has led to numerous corrections and additions, extending over seven pages. The "usual if not the only Somerset plant" of the *Alchemilla vulgaris* aggregate is *A. minor* Hudson (*A. filicaulis* Buser). *Daucus gummifer*, which appeared in the *Flora*, is withdrawn, as also is *Gentiana campestris*. The treatment of *Hieracium* is greatly amplified, and contains interesting notes; the single *Euphrasia* of the *Flora* is distributed among fourteen names, the result of observations published since Mr. Murray's book was written. *Mentha* also has undergone considerable amplification. It may be noted here that *Euphorbia Lathyrus*, which is given in the *Flora* for Steep Holm as "not truly wild" and "naturalized," was found there by Banks in 1773; his specimen in the National Herbarium is endorsed by himself:—"I found this one plant among the Ligustrum on the south side of the Steep Holmes Island, but being hurried by the tide had not time to search for more." There are interesting additions to *Salicornia*, represented in the *Flora* only by *S. herbacea*; and a long note on the Snowdrop calls attention to the probability of its nativity in the county. The "var. *bracteata* Druce" of *Scilla nonscripta* is supposed to be "rather a form than a variety"; a note to this effect will be found in Journ. Bot. 1908, 200, where it is shown that the authority for the name should be "Hort. ex Baker." *Wolffia* is an interesting addition to the county list, and *Asplenium germanicum* was probably accidentally omitted from the *Flora*.

These are but indications of the valuable information which render this Supplement, apart from the Flora to which it relates, of interest to all concerned with the study of British plants.

Mr. Magnus Spence's *Flora Orcadensis* contains much of interest. Dr. Irvine Fortescue tells us in his "Foreword" that it "is the result of many years of careful observation and research, and the author has spared neither time nor trouble in making his work as full as possible." The introductory portion includes among other interesting matter accounts of the author's excursions and the notes in the section entitled, not very happily, "Natural Selection"; there is also useful biographical matter concerning previous contributors to our knowledge of the flora; the sketch of the geology is very comprehensive.

The list of species, in which introductions are prominent, suggests that Mr. Spence has not, *pace* Dr. Fortescue as quoted, done quite all that he might have done to elucidate his subject, and there is an air of uncertainty about some of his entries which detracts a good deal from their value. Thus of a "var. *montana*"—a name with which we are not familiar—of *Vicia sepium* he writes: "This is said to be found in Lyradale, Redland. I have not seen it, and do not know on whose authority it is given"; while, having definitely recorded *Alchemilla vulgaris* var. *montana* on his own authority, as well as on that of a contributor, he says in a later paragraph, "Rev. E. F. Linton, in a paper on the segregates of *A. vulyaris* [*sic*], states that *A. montana* is not British: in that case the variety in Orkney will be *A. filicaulis*," which has already had a separate entry. Of *Epilobium tetragonum* he says:—"Some doubt has been expressed as to whether this plant grows in Orkney; but I believe it is to be found in several places in St. Andrews": surely this might have been decided?

The most interesting note in the book is that contributed by Mr. Moss (p. 138), in which he refers to a plant sent by Mr. Spence (who however had pointed out its differences) to Mr. Hunnybun as *Primula scotica*: of this Dr. Moss had at first regarded it as a variety, but he now considers it possibly identical with *P. stricta* Fries, although further material is necessary before this can be decided. Those who use the book must not overlook the numerous additions to the text on pp. 127–137: another appendix of "plants used medicinally" would have been better incorporated in the text. So-called "English" names are given throughout: there are also a few local names of interest—*Achillea Millefolium*, "meal-an-folly"—a corruption of the specific name; *Artemisia vulgaris*, "bulwands" and "grobbie"; *Spiræa Ulmaria*, "yule-girse"; *Menyanthes*, "craw-shoe"; seeds of *Spergula*, "reuth"; *Tormentilla*, "hill-barks." There is a list of Mosses by Lieut.-Col. James Grant, of whom, as of Mr. Spence, a portrait is given; with the exception of these and of the ferns and allies and Charas, only phanerogams are included.

The book, interesting as it is, is one which might easily have been better had it been submitted to a competent "reader," who would at least have corrected the typographical blunders, which are sadly numerous—we note on one page (141) "Lepidopitra," "Sperganum," "palustra," and misplaced capitals: he would also have instructed the author in the art of making references. We are indebted to Mr. Bennett for some notes on the work, which we hope to print in an early number.

BOOK-NOTES, NEWS, &c.

Joseph Reynolds Green, who died at Cambridge on June 3, was born at Stowmarket, Suffolk, on December 3, 1848. He went to Trinity College, Cambridge, in 1878, having previously taken his B.Sc. at London University; he graduated as M.A. in 1888 and took his D.Sc. in 1894, and was elected a Scholar of his college. After taking this latter degree he worked in Michael Foster's laboratory on the enzymes contained in the seeds of plants; he then undertook researches on fermentation, and in 1899 published a book on Soluble Ferments. In 1887 he became Professor of Botany to the Pharmaceutical Society, an office which he held for twenty years, and was Hartley Lecturer on Vegetable Physiology in Liverpool University. In 1892 he was elected Fellow of Downing College, and in the same year was president of the botanical section of the British Association, at whose meetings he was a constant attendant. In 1895 he published a Manual of Botany, in two volumes, and in 1905 an excellent *Introduction to Vegetable Physiology*; in 1909 appeared his continuation of Sachs's *History of Botany*, dealing with the period 1860—1900. At the time of his death he had completed a work on the History of Botany in England, which will probably be published. He became a Fellow of the Linnean Society in 1889 and was elected F.R.S. in 1895.

The *Journal of Genetics* for June (vol. iv. part 1) contains a long paper by G. H. Skull, of the Carnegie Institution of Washington, on "A Peculiar Negative Correlation in *Œnothera* Hybrids." As a result of his experiments the author criticizes somewhat severely some of the conclusions arrived at by Dr. R. B. Gates in his papers on the genus published in the Linnean *Transactions* and elsewhere; the paper is illustrated by two plates. M. Wheldale and J. & Ll. Bassett write "On a Supposed Synthesis of Anthocyanin"; N. I. Varilov, of the Agricultural Higher School of Moscow, has a paper on "Immunity to Fungus Diseases as a Physiological Test in Genetics and Systematics, exemplified in Cereals," more especially in wheat and oats; and H. M. Leake, Economic Botanist to the Indian Government, has a preliminary note "On the Factors controlling the Ginning per cent. of Indian Cottons."

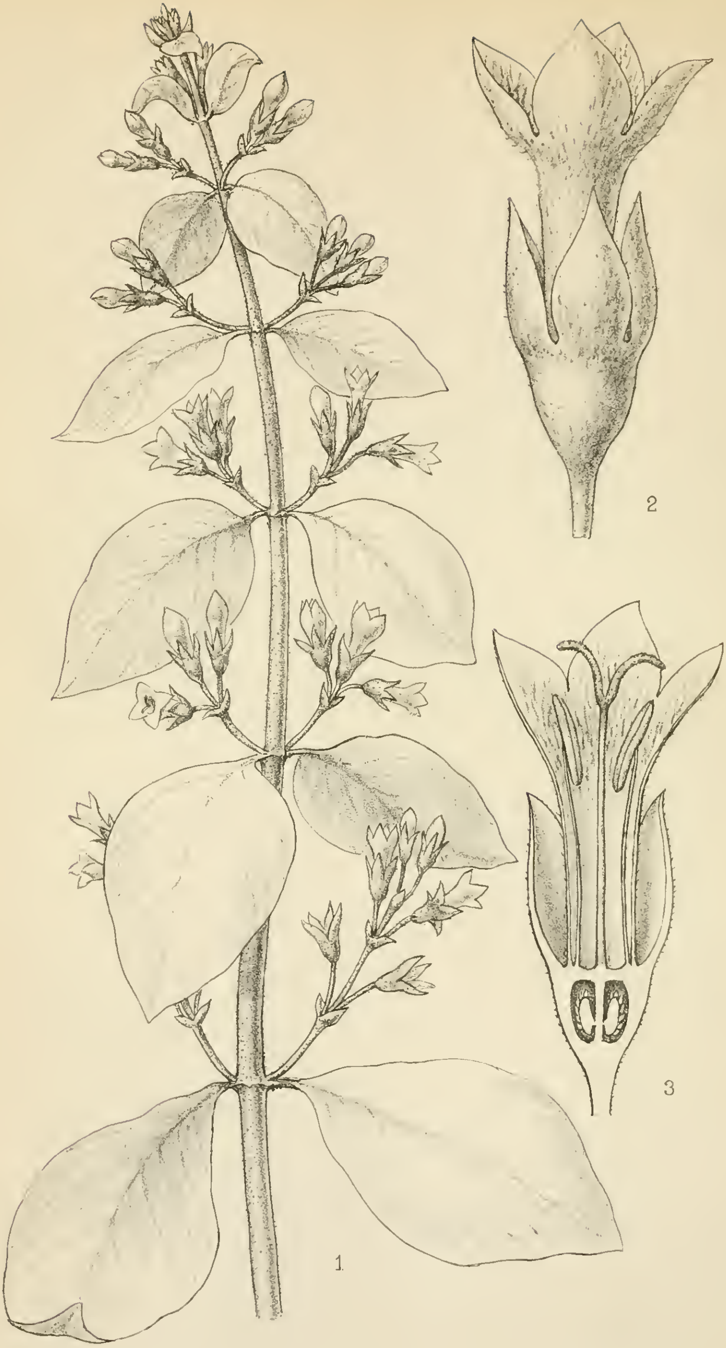
To the meeting of the Linnean Society on June 4 Professor H. H. W. Pearson contributed a paper, "Notes on the Morphology of certain Structures concerned in Reproduction in *Gnetum*"—an investigation of (1) androgynous and pseudo-androgynous spikes of *Gnetum Gnemon*; (2) the young embryo sac of *G. africanum*. The spike which bears the male flowers occasionally shows complete female flowers in the lowest node or nodes. These flowers become pollinated. Their occurrence no doubt explains earlier references to the presence of fertile seeds on the "male" spikes. One of the complete female flowers in this position possessed four envelopes, the outermost of which bore an axillary bud. The two envelopes which stand between the outermost and the innermost are interpreted as being derived by duplication from the normal middle envelope. In its vascular supply and other characters, the axis of the "male" spike of *G. Gnemon* resembles that of *G. scandens*, and differs from those of the West African species. The microspore-mother-cell is 4-chambered. The pollen-grains in the micropyle contain either two or three apparently free nuclei. In the nucellus of the female flower the "pavement tissue" described by Coulter for *G. Gnemon* is formed also in *G. africanum*. Lotsy's account of the appearance of a cellular endosperm in the chalazal end of the sac of *G. Gnemon* before fertilization is true for *G. africanum* and confirmed for *G. Gnemon*. In *G. africanum* the nuclei of these cells are all formed by fusion, as in *Welwitschia*. The fusing nuclei appear to be both morphologically and physiologically equivalent to the free gametes of the micropylar end of the sac. The primary endosperm is therefore homologous with that of *Welwitschia*. Reasons for regarding it as morphologically different from the prothallus of *Ephedra* and the lower gymnosperms are discussed.

The latest number (xlii. 286, July 14) of the *Journal of the Linnean Society* (Botany) contains a monograph of the African species of *Crotalaria*, by Mr. E. G. Baker. For the purpose of his paper, Mr. Baker has visited the Herbaria at Paris, Brussels, and Berlin, and from these, in addition to the collections in the Kew and National Herbaria, he has obtained material which has brought up the number of African species to 309, of which 76 were previously undescribed. "Of these novelties, 9 belong to the section Simplicifoliæ, 21 to the Sphærocarpæ, 1 to the Spinosæ, 45 to Eucrobalaria." The paper, which is accompanied by six plates, bears testimony to the great strides that have been made in our knowledge of African botany since the publication of the *Flora Capensis* (1861) and the *Flora of Tropical Africa* (1871) in which 106 and 24 species are respectively enumerated.

The collection of drawings of South African flora and fauna made by Robert Jacob Gordon, of which some account was given on p. 75, has been purchased by a committee in Holland, formed for the purpose, at the price of £1250. The drawings will be placed in one of the State museums.

The *Report of the Watson Botanical Exchange Club* for 1912–13 has reached us; we hope to give some extracts from it in an early issue.

The Editor wishes it to be understood that he does not concur in the views as to nomenclature expressed by Dr. Moss in his paper on *Alsine* (pp. 196–201).



P. Highley del. et lith. West, Newman imp.

Neosabicea Lehmannii *Wernham.*

NEW RUBIACEÆ FROM TROPICAL AMERICA.—IV.

By H. F. Wernham, D.Sc., F.L.S.
(Department of Botany, British Museum.)

(Continued from vol. li., p. 324.)

(Plate 533.)

Neosabicea Wernham,
Rubiacearum e tribu Mussændearum novum genus.

Calycis lobi 4 subfoliacei plus minus angusti, elongati, subæquales. *Corolla* subtubularis sub lobos parum ampliata; lobi breves, valvati; tubus intus insuper dense pilosa. *Stamina* 4, tubi basi inserta; filamenta tenuissima elongata; antheræ dorso affixæ, lineares obtusæ. *Discus* inconspicuus. *Ovarium* biloculare; stylus filamentosus inclusus apice bilobus; ovula in loculis pauca complanata, placentis tumidis septo prope basin affixis adscendentibus plus minus impressa. *Fructus* . . . Herbæ suffruticosæ scandentes. *Folia* opposita; stipulæ minimæ fere obsoletæ. *Flores* parvi in racemis axillaribus dispositi.

N. Lehmannii Wernham, sp. unic. Frutex volubilis, ramulis pubescentibus; *foliis* ellipticis vix acuminatis obtusis basi nonnunquam cuneatis ± 5 cm. × 3 cm., supra scabridulo-pubescentibus subtus pubescentibus, venis subtus prominulis secundariis utrinque ca. 8, petiolo brevi 2–5 mm. longo, *stipulis* fugaciis; *racemis* paucifloris pubescentibus, ca. 5 cm. longis; *calycis* lobis lanceolatis subacutis vix ad 5 mm. longis; *corollæ* extus sparsiuscule pubescentis tubo insuper parum ampliata vix 1 cm. longo, lobis ovatis subacutis ca. 4 mm. × 3 mm.

Colombia: Cauca, Popayan, 7150 ft., *Lehmann*, 3514! Hb. Mus. Brit.

Remijia Trianæ Wernham, sp. nov. Frutex ramis crassis angulatis ferrugineo-villosis, novellis dense tomentosis; *foliis* oppositis v. ternatim verticillatis subcoriaceis ellipticis ad ca. 40 cm. × 18 cm. basi angustatis leniter acuminatis, supra glabratis subtus præsertim in venis hispidulo-villosis, venis supra impressis subtus prominulis secundariis utrinque ad ± 20; petiolo valido basi nonnunquam tumido ad 4 cm. v. longiore; *stipulis* maximis tarde deciduis foliaceis ovato-lanceolatis acuminatis acutis ad 8 cm. × 3 cm. extus rufo-hispidulis; *inflorescentia* ad 35 cm. longa, bracteis submembranaceis stipularum forma multo tamen minoribus ± 2 cm. × 8 mm.; *floribus* parvis, *calycis* lobis brevissimis triangularibus, *corollæ* tubo ± 8 mm. lobis subæquantibus; *fructu* ovoideo, ca. 2·5 cm. × 1·5 cm., glabrescente.

Colombia: Villavicencio, Plain of San Martin, 1300 ft., *Triana*, 3273/1! Hb. Mus. Brit.

Allied to the Brasilian *R. ferruginea* DC., but distinct, especially in the much larger and differently-shaped leaves, with longer petioles, larger persistent stipules, short, broad calyx-teeth, &c.

Declieuxia peruviana Wernham, sp. nov. Suffrutex ramulis virgatis novellis gracilibus fere glabris tardius cortice argenteo-

griseo indutis; *foliis* linearibus subcoriaceis ± 1·3 cm. × 2 mm. obtusis sessilibus margine revolutis glabris venis nisi subtus centrali prominula occlusis, *stipulis* triangularibus ca. 2 mm. × 1 mm. conspicuis acutissimis rigidulis; *inflorescentia* subcapitata 1·5–2 cm. in diam.; *floribus* parvis vix 5 mm. longis extus glabris.

Peru: Chachapoyas, *Mathews*! Hb. Mus. Brit.

Remarkable for its small linear leaves and delicate habit.

Declieuxia roraimensis Wernham, sp. nov. Glaberrimus, *foliis* lanceolatis 7–11 cm. × 2–3 cm., utrinque angustatis apice subacutis, petiolo brevi vel ad 1·3 cm. longo, *stipulis* lanceolatis acuminatis 7 mm. × 3 mm. infra medium bifidis; *floribus* parvis in cymis corymbosis folia excedentibus longe- (5–6 cm.) pedunculatis dispositis, *calycis* limbo subintegro, *corollæ* tubo 5 mm. longo insuper infundibulari lobis oblongis obtusis 2–3 mm. longis.

British Guiana: Roraima, *Schomburgk*, 581! Hb. Mus. Brit.

Differs from all other species known to me in the habit, which closely resembles that of many *Psychotriæ*, as also in the bifid stipules. De Candolle (Prodr. iv. 481) described a plant which he named suggestively *D. ? psychotrioides*, expressing, however, a doubt as to the genus, as no flowers were present. This also has bifid stipules, according to the description; but they are said to be subulate, the peduncles short, the inflorescence falling considerably short of the leaves. De Candolle gives as localities for *D. psychotrioides*, Cayenne (*Patris*), and Panama and Mexico (*Haenke*).

Lindenia.

The genus *Lindenia* is an interesting member of the tribe *Rondeletieæ*, with long-tubed, showy flowers. Two species have hitherto been known from the New World, *L. acutiflora* and *L. rivalis*, both natives of Central America, and forming the respective subjects of plates 475, 476 in Hooker's *Icones*. The genus comprises two other species, *L. austro-caledonica* Brongn. and *L. vitiensis* Seem., the locality being indicated in each case by the specific name.

The flower typical of *Lindenia* recalls that of the large-flowered *Mussændæ* with subequal calyx-lobes. The two following species are very distinct from those previously described; both are preserved in the Kew Herbarium, to the authorities of which I am greatly indebted for the privilege of examining the material.

L. radicans Wernham, sp. nov. Frutex repens, caulibus gracilibus novellis appresse pubescentibus demum glabrescentibus; *foliis* membranaceis ellipticis utrinque angustatis acutis acuminatis, 5-8 cm. × 2–3 cm., cystolithis breviter linearibus dense onustis, venis utrinque appresse hirtellis, secundariis utrinque 4–6, *petiolo* gracillimo ad 2 cm. longo, *stipulis* e basi brevissime triangulari subulato-setaceis; *floribus* solitariis sessilibus; *calycis* laciniis linearibus acutis inæqualibus ad ca. 2 cm. longis; *corollæ* tubo gracili extus appresse pubescente ca. 4·5 cm. longo, lobis latis dorso subsericeis margine ciliatis rotundatis nec acuminatis ca. 1·5 × 1·1 cm., ore minute necnon densiuscule ferrugineo-furfuraceo; *staminibus* omnino inclusis; *ovario* dense appresse griseo-pubescente biloculari.

Mexico: shaded places on rocks at crossing of the river near Tocotepeque, July, *Hartweg*! Hb. Kew.

Remarkable for the creeping habit, thin leaves with densely packed and conspicuous cystoliths, rounded corolla-lobes, and included anthers.

L. acuminatissima Wernham, sp. nov. Frutex, *foliis* pergamaceis lanceolatis utrinque angustatis acutis ad ca. 3 × 1·2 cm. supra subnitentibus necnon glabrescentibus subtus pubescentibus, brevissime petiolatis, *stipulis* brevibus acutissimis rigide subulato-triangularibus. *Floribus* in axillis solitariis; *calycis* lobis subulato-linearibus ca. 4–7 mm. longis; *corollæ* tubo ad 7–8 cm. longo extus dense appresse sericeo, lobis 2·6 × 1 cm. ellipticis caudato-acuminatis acutissimis.

Barclay! in Hb. Kew.

The label bears the names "Gardenia mitis. Tobago Jasmine"; the exact locality is thus, unfortunately, doubtful. The new species is allied to *L. rivalis*, but it is readily distinguishable therefrom by the lengthy acumination of the corolla-lobes and the much shorter calyx-lobes.

Explanation of Plate 533.—*Neosabicea Lehmannii* Wernham.—1. Portion of flowering-shoot, natural size. 2. Single flower, × 4. 3. Flower in longitudinal section, × 4.

ALPINE VEGETATION ON BEN-Y-GLOE, PERTHSHIRE.

By Albert Wilson, F.L.S., and J. A. Wheldon, F.L.S.

In the copious literature devoted in recent times to the subject of plant geography, the constituents of the chief plant associations of Great Britain have been well discussed, and the subject has reached a further stage in its evolution, *viz.* the investigation of the inter-relation of the various units included in each group, and the causes which determine the presence or absence of certain of them. This necessitates a careful biological study of each species, and an inquiry into its means of adaptation to the ecological conditions of the habitat.

Although this advanced stage has been rapidly reached in the case of the higher plants, owing to wide floristic knowledge gleaned by generations of enthusiastic "field botanists," our information on the grouping of associations dominated by cryptogams is still incomplete, and the literature somewhat scanty. In the various associations dominated by spermophytes, their cryptogamic associates have not been fully worked out, and only the more conspicuous ones are mentioned in lists of characteristic species, frequently, indeed, the generic name alone being deemed sufficient, e. g. *Bryum*, *Sphagnum*, *Polytrichum*, *Cladonia*, &c. Yet these genera contain species insisting on very varied climatic and edaphic conditions, and as a rule it will be found that cryptogamic plants are very sensitive to such influences, and often form a reliable index to the climatic and geological conditions of the environment.

But before the effect of these conditions can be adequately gauged, there is much preliminary work of a systematic and floristic nature to be done. These few notes, meagre as they are, may therefore have their value as a small contribution to our knowledge of one of the more inaccessible and less easily worked "formations," *viz.* the Upper-Arctic Alpine Formation.

Before going further it may be well to explain what is meant by the term Upper-Arctic Alpine Formation. It consists briefly of the flora of the higher mountain summits in Great Britain. Where the continuous undulating and rising ground begins to be differentiated into individual summits, a change from the prevailing moorland and subalpine vegetation becomes noticeable. In addition to the characteristic plants of such habitats, we begin to find examples of Arctic types; and, to meet conditions of greater exposure, the morphological features of the species become modified in various ways, with which botanists are now familiar. At 2700 ft. and upwards, the Upper-Arctic Alpine Flora predominates. It is divided by Moss (1) into three groups. The first, the *Chomophyte Association of Crags and Corries*, does not concern us here, as we did not meet with this class of habitat on the route by which we ascended Ben-y-Gloe. The two remaining divisions are sections of what R. Smith (2) termed the "Alpine plateau" and Warming "Fell-field." One of them, the *Moss-Lichen Association*, is an open association occurring on fairly level plateaux and scree-slopes, the vegetation being sparsely scattered over ground strewn with gravel, stones and boulders. The other is a closed association, occurring on slopes of usually less broken ground at similar altitudes, known as *Rhacomitrium Heath*, which at its lower limits, and under certain conditions, passes into various moorland groups. Two other associations are possibly to be separated within the formation—that dominated by Anthelia (3) on wet rocky slopes; and the Marsupella Association of Macvicar (4), which is partial to slopes facing east and north, and is dominated by hepatics and such plants as *Dicranum falcatum*. The two associations described in this paper are the *Moss-Lichen Association* and the *Rhacomitrium Heath*, which are well-marked and distinct on Ben-y-Gloe, although they frequently show transition stages, and become more or less intermingled. Such modifications we have observed on a slope of Braeriach towards Glen Eunach in West Invernesshire, and elsewhere.

The flowering plants of these associations have been fairly well worked out and recorded, and we do not propose to devote attention to them now. Many of our most interesting Highland plants are included amongst them, such as alpine species of *Potentilla*, *Alchemilla*, *Vaccinium*, *Arctostaphylos*, *Saxifraga*, *Azalea*, *Salix*, *Juncus*, *Luzula* and *Carex*. The species are, however, less numerous than in the *Chomophyte Association*, or in the groups of the lower slopes of the hills.

The Cryptogamic Flora, on the contrary, requires much further exploration. In Mr. Tansley's *Types of British Vegetation*, the flora of the *Rhacomitrium Heath* is represented by a list compiled from field notes by R. Smith and C. E. Moss, and from indications in local floras. The only cryptogams mentioned in this list are *Rhacomitrium lanuginosum*, *R. ericoides*, *Cetraria islandica*, *Cladonia rangiferina* and *Peltigera canina*. It may be remarked in passing that, of the subsidiary species named, *Cladina rangiferina* was the only one we saw on Ben-y-Gloe. In the list representing the *Moss-Lichen Association* in the same work (1), no mosses or lichens are included, which is rather suggestive of a certain Shakespearian play produced with the part of Hamlet excised. But the florulæ of these associations vary greatly on different mountains, and even on different portions of the same *massif*, according to the altitude, aspect, degree of moisture, steepness of slope, and rock-constituents. In a more recent work by C. B. Crampton (5), the plateaux *débris* of quartzite hills in Caithness is stated to contain the following mosses and lichens:—*Rhacomitrium lanuginosum*, *Hypnum Schreberi*, and *Cladina*, spp. Dr. Moss says (*loc. cit.*): "The lists of species available at present do not warrant any attempt to draw up complete lists; as to the lower plants there is little information."

It was principally for this latter reason that, happening to meet with fine examples of these associations on Ben-y-Gloe, we deemed it advisable to make a few notes on their constituents. This mountain, "the mountain of the mist," attains a greater height and has a finer outline than any other in Perthshire, east of Tay and Garry. It is situated about seven miles north-east of Blair Atholl and rises direct from Glen Tilt. There are two peaks, a western one having an altitude of 3505 ft., and an eastern —known as Carn nan Gabhar or "Cairn Gowar"—rising to 3671 ft.

We spent but a few hours on the mountain, and owing to thick mist only reached the lower of the two peaks. The ascent was made from Glen Tilt in rain and mist, on May 6th, 1912, the course being up the north-west side of the mountain. The aspect presents very little crag or rock exposure, and loses the interest provided where the chomophytic formation is present. Where this latter exists contiguous to the associations we are dealing with, the species are often reinforced from the crags and show greater variety.

The lower slopes of Ben-y-Gloe are covered with the usual grass association so common in the Highlands, above which there is a considerable area of heather moor, with, in places, patches of ground dominated by *Scirpus cæspitosus*. In the heather moor the chief *Sphagna* noted were compact tufts of *Sphagnum rubellum*, *S. fuscum*, and a little *S. subnitens*, thus differing from our Lancashire moors, on which *S. papillosum* predominates, and *S. fuscum* is practically absent. The ling thins out as the ground rises, and above 2500 ft. becomes much mixed with crowberry (*Empetrum nigrum*) and some bilberry (*Vaccinium Myrtillus*). At about 2800 ft., near the shoulder of the flat-topped ridge or plateau which leads up to the summit on the south-west, the ground is somewhat broken and stony, the association becomes gradually more open, and eventually resolves itself into a fair area of the *Moss-Lichen Association.* We were able to make a careful examination of only a small portion of this ground, and the list of species submitted below is of necessity incomplete. The season was very early for this altitude, and the time allowed by train arrangements was all too short for searching out the more minute cryptogams. Moreover, the different classes of these plants require searching for on separate occasions. We have found from experience how easily mosses and hepatics may be overlooked when lichens are being collected, and how incompatible the quest of flowering plants is with that of the smaller cryptogams. Subject to allowance for these limitations the following is a complete list of all the species noted on this detached portion of the *Moss-Lichen Association*, occurring on boulders, stones, and thin soil overlying the quartzite rock:—

Flowering Plants.

Alchemilla alpina L.
Empetrum nigrum L.
Gnaphalium supinum L.
Vaccinium Myrtillus L.
Salix herbacea L.
Aira and other grasses not in flower.

Vascular Cryptogams.

Lycopodium Selago L.
L. alpinum L.

Mosses.

Andreæa petrophila Ehrh.
Polytrichum alpinum L.
P. piliferum Schreb.
Dicranum fuscescens Turn.
D. scoparium v. *turfosum* Milde.
Rhacomitrium heterostichum Brid.
R. lanuginosum Brid.
Webera nutans Hedw.

Hepatics.

Diplophyllum albicans Dum.

Fungi.

Ticothecium erraticum Massal.

Lichens.

Cladonia cervicornis Schaer.
Thamnolia vermicularis Schaer.

Lichens (*continued*).

Stereocaulon coralloides Fr.
S. evolutum Graewe.
Sphærophorus fragilis Ach.
Cetraria aculeata Fr.
Platysma triste Cromb.
Gyrophora polyphylla T. & B.
Parmelia alpicola Fr. fil.
P. lanata Wallr.
P. lanata var. *reticulata* Cromb.
Lecanora polytropa Schaer.
L. badia Ach.
Hæmatomma ventosum Mass.
Lecidea aglæa Sommerf.
L. fuscoatra Ach.
L. Kochiana Hepp.
L. lithophila Ach.
L. lapicida Fr.
L. auriculata Th. Fr.
L. contigua Fr.
L. confluens Ach.
L. fusco-cinerea Nyl.
L. limosa Ach.
L. demissa Th. Fr.
L. griseoatra Schaer.
Buellia badioatra Koerb. var. *atrobadia* A. L. Sm.
Rhizocarpon geographicum DC.
R. geographicum DC. var. *atrovirens* Koerb.
R. confervoides DC.

Ascending another 700 ft., the summit plateau is reached, consisting of the same kind of broken gravelly ground, with scattered stones, and patches of very thin soil, formed chiefly of the *débris* of cryptogamic plants. The flora at this elevation is slightly different. The dominant plants are *Carex rigida* and *Alchemilla alpina*.

The quartzite blocks, of which the cairn is built, yield additional *Gyrophoræ*, viz. *G. erosa*, *G. torrefacta*, and *G. cylindrica*, the first and last-named being very scarce. On loose stones we saw a small quantity of a sterile *Pyrenopsis*, but *Parmelia alpicola* was fairly well developed on quartz crystals. On half-decayed patches of *Cladonia*, *Rhacomitrium* and *Dicranum fuscescens* there is an abundance of *Lecanora tartarea* var. *frigida*, with *Lecidea arctica* Somm. and *L. limosa* Ach., on peaty soil filling the crevices of the stones. These two lichens appear to thrive in the most bleak and exposed situations offered by our mountains. They are accompanied by a few starved-looking examples of *Thamnolia vermicularis*, a curious Cladonia-like plant, resembling in shape a small white earthworm. So far as we observed, this lichen is much less fine and abundant here than in the moss-lichen association of the granitic summits of the Cairngorm range. We saw here the hepatic *Gymnomitrium obtusum*, and no doubt other minute species might have been noted had conditions permitted a more careful search; but the Bryophyta were not obtrusively evident. Two lichens, *Lecidea tabidula* Nyl., and *L. deparcula* Nyl., are recorded by Crombie (6) as occurring on small stones on this summit, but we failed to find them, although they doubtless enter into this association, as also does *Lecidea nigroglomerata* A. L. Sm. on Cairn Gowar.

Turning now to ecological considerations, this particular ground, from the broken nature of the surface, which is weathered into stones and gravelly detritus, is subject to rapid drainage, and there is practically no available subsoil water for the plants near the surface. The hard crystalline rock is markedly dysgeogenous, and not retentive of moisture. Any soil formed is either washed down into the interstices, or completely removed by the fierce gales to which these plateaux are exposed. But for the frequent showers and cloud-fog, and occasional pockets in which a little humus is detained by the matted stems of cryptogams, the higher plants would scarcely be able to exist. In such situations the amount of rainfall is of minor importance as compared with its frequency, and probably the plants depend more on the prevalent cloud-mist than on rain for their supplies. There are intervals of bright sunshine and strong wind, producing rapid evaporation of moisture. Added to this frequent desiccation there is considerable fluctuation of temperature, producing together a set of conditions which reduce the possibilities of plant life almost to zero.

The special contrivances by which certain flowering plants are enabled to face these untoward circumstances are well known and need not be repeated. As regards the Bryophyta, they are mostly small and densely tufted, and the tufts are frequently sunk in crevices of the rock or ground which they completely fill, allowing little purchase to the wind. The leaves are frequently very hygroscopic, as in chomophytic species, in wet weather open, in drought closely appressed and imbricate. The stunted growth, often attained by a shortening of the internodes, brings the leaves closer together, so that when appressed their apices alone are exposed. The cells are usually small, thick-walled, and often the thickness is increased externally by papillæ. This seems to be especially the case with mosses having comparatively blunt leaves. These papillæ probably act, like the apices of the leaves, as foci on which moisture condenses during cloud-fog. The Lichens, also, are usually diminutive in size, or, if of larger growth, more or less compact and cushion-like. The only *Cladonia* noted was a small form of *C. cervicornis*, in which the thallus was reduced to a dense squamulose cushion, and the podetia very diminutive. *Stereocaulon* and *Sphærophorus* occur in very compact forms, the outer stems prostrate, the next inclined, the central ones erect, so that the points only are exposed, and no lateral stress is received in wind-storms. The only foliose *Parmelia* seen was the closely appressed *P. alpicola*, which is so reduced as to resemble a crustose *Lecanora*. The laciniæ of the thallus are very convex, imbricate and complicate, and often torulose, so that when wetted the water is partly retained in the very numerous depressions thus formed in the thallus, and such as finds its way under the subtubular divisions is retained. The tough leathery *Gyrophoræ* are centrally affixed, and often depressed at the margins, forming shields beneath which moisture is retained longer than on the open rock. In the case of *G. torrefacta* the under side is often fibrillose and covered with several trabeculate membranes, the whole producing a sponge-like texture. Occasional perforations admit moisture under the thallus. *Lecanora tartarea* assumes a very different appearance from that which it presents on trees or rocks at lower altitudes. It creeps over mosses and plant-roots, giving off at intervals slender spinulose processes, which no doubt act as dew-collecting points. The erect fruticose lichens, so plentiful in the next group, are almost absent. They are represented by *Parmelia lanata*, a decumbent or prostrate appressed plant with the appearance of *Alectoria nigricans*, but a totally different habitat and mode of growth; and *Thamnolia vermicularis*, a prostrate plant which hardly leaves the ground except where it turns up its pointed ends as an attraction to the dew. Many of the *Lecideæ* have large fruits, and very little thallus. The hyphæ ramify in minute interstices of the stone, and the gonidia cluster under the lee of their own apothecia, so that they often at first sight appear to be quite athalline. This is especially the case on loose stones of small size, where the conditions are intensely dry.

Like the scouts of an army, these outposts of vegetable life lead a precarious existence, and they take "cover" behind any prominent object, especially on the leeward side. Their growth in a horizontal direction is often determined by the height of some neighbouring tuft or stone, in the shelter of which they lie.

The attitude of many of the species may be described as one of "crouching" to obtain shelter from the wind. When shelter and moisture are both denied them, they have still a defence in reserve. Before a prolonged drought they simply adopt a condition of suspended animation. How long they can so live would be difficult to ascertain, but they must certainly be able to lie dormant for several weeks without injury.

From the lower to the higher of the two plateaux or terraces described above, the ground rises in a moderate slope, and affords an excellent example of the closed *Rhacomitrium Heath Subassociation.* The requisite conditions appear to be rapid drainage, shallow soil, and a low mean temperature. Another condition which has been suggested as favourable for the production of *Rhacomitrium* heath is the absence of direct sunshine from northern slopes for several months during the winter, owing to the low angle of elevation of the sun. The ground is also usually too steep and wind-swept for great accumulations of snow. On Ben-y-Gloe the drifts or *Schneeflechten* which we encountered lay below the *Rhacomitrium* heath.

Except where the thick dense carpet of *Rhacomitrium* has been accidentally torn away, or where jutting rocks protrude through its compact layers, this association in its most perfect development contains few or none of the higher plants. The stems of the moss become procumbent, overlapping each other to a considerable depth, and the subsidiary vegetation consists mainly of lichens attached to its decaying branches. Macvicar (4) in alluding to the *Rhacomitrium* heath says "the hepatics are almost absent from it," and so we found it here. We are able also to agree fully with the following statement by Moss (1): "While the closed *Rhacomitrium* association would appear to increase the shelter for other species, it is noteworthy that the proportion of Highland species is generally less in it than on the more open stony waste." It is probable these remarks were intended to apply to flowering plants, but they are also applicable to the mosses, hepatics, and lichens.

The *Rhacomitrium* heath forms a delightfully soft and springy carpet to the feet of the traveller, and the change from the arduous toil of the heathery lower slopes is always welcomed by the climber. We found the flora here, as on similar tracts of other mountains, poor and scanty. It is doubtful if a prolonged search even at a more favourable time of the year would have added very materially to the list of species noted in the centre of the moss-carpet, *i.e.* where the association is closed and perfect. Probably, however, a considerable number of small cryptogams and encroaching spermophytes might be detected at various points where it merges into other formations. The paucity of species in the closed *Rhacomitrium* heath overlying quartzite rocks will be seen from the following list, in which the species are arranged in order of frequency.

Dominant.

Rhacomitrium lanuginosum Brid.

Abundant.

Cladina rangiferina Nyl.
Cetraria crispa Nyl.
Alectoria nigricans Nyl.

Frequent.

Cladina sylvatica Nyl.
C. uncialis Nyl.
C. uncialis Nyl. v. *obtusata* Nyl.
C. uncialis Nyl. v. *turgescens* Cromb.
Cladonia deformis Hoffm.
Empetrum nigrum L.

Occasional.

Hypnum Schreberi Willd.
Cladonia furcata Hoffm.
Dicranum fuscescens Turn.
Carex rigida Good.
Lycopodium alpinum L.
Polytrichum alpinum L.
Cetraria aculeata Fr.
Cladonia cervicornis Schaer.
C. gracilis Hoffm.
C. macilenta Hoffm. v. *coronata* Nyl.

Rare.

Cladonia destricta Nyl.
Lecanora tartarea Ach.
Cladonia bellidiflora Floerke.
C. squamosa Hoffm. forma.
C. degenerans Floerke.
C. degenerans Floerke v. *pleolepidea* Nyl.
Alectoria ochroleuca Nyl.
Bæomyces æruginosus DC.
Bilimbia melæna Arnold.
Hypnum cupressiforme L.
Hylocomium loreum B. & S.
Ptilidium ciliare Hampe.
Galera hypnorum Fr.

The majority of the species in this list ascend considerably above the 3000 ft. contour. The vegetation of the plateau gravel has been described as cushion-like or crustaceous; that of the present association may be said to be mat- or carpet-like. The dominant moss has long, much divided, trailing stems, which are interlaced together by numerous short hooked branches and long leaves. This clinging of the stems does not always prevent strong gales from tearing up large sheets of the carpet. Bare patches formed in this manner revert to the moss-lichen stage until the *Rhacomitrium* reassumes dominance. The apices of the leaves of this moss are devoid of chlorophyll, papillose and eroso-ciliate, thus presenting innumerable small prominences for the reception of dew. It will be observed that this echlorophyllose area is as papillose as the rest of the leaf, and therefore we cannot in this instance regard the papillæ as simply designed to shield the chlorophyll from the sun, or to prevent evaporation, which is usually accepted as their *raison d'être*. The condensed moisture, or, during showers, rain-water, runs down to the thick underlying mass of old stems and leaves, which hold it like a sponge. Still lower a layer of humus is rapidly formed. Most of the flowering plants and other dependent species cower beneath the shelter of the moss, only in favourable seasons protruding their growing tips, and, as is apparent from the paucity of individuals as well as species, often suffering severely for their temerity in so doing. The smaller mosses and lichens, especially those of effuse horizontal growth, have no chance, and are rapidly smothered, the erect fruticulose lichens greatly preponderating. *Cladinæ* and *Cladoniæ* with elongate podetia are frequent, presenting often spinulose points above the moss. *Cetraria crispa* straggles up through the mats, singly or in dense tufts. Its margins are beset with cilia, giving it a distant resemblance, on a larger scale, to the eroded leaf-margin of the dominant moss. In dry weather the thallus rolls up and becomes subtubular. Some of the large-branched *Cladoniæ* have perforate axils, the orifices being at times spinulose, the spines acting as water conductors to the interior of the hollow podetia. A lichen almost confined to this association is *Alectoria nigricans*, and the allied *A. ochroleuca* is also partial to it. They resemble miniature trees. The trunks obtain support by standing buried in the *Rhacomitrium*, the branches rising above the surface, where they ultimately become dark and discoloured by exposure to sun, wind, and frost. In dry weather they are readily overlooked, but under moister conditions their entangled ramuli and slender branchlets become everywhere studied with tiny drops of dew, and are then very noticeable. When dry they are rigid and brittle ; then the feet of the alpine hare or ptarmigan readily crush them into small particles, to be disseminated by the wind. In this manner this rare lichen is probably propagated ; its fruit is unknown with us, but has been found, according to Crombie (7), in Labrador and Arctic North America.

It must be observed that this list of species applies only to the Upper Arctic-Alpine formation of Ben-y-Gloe, and that had we been dealing with the similar formation of the micaceous *débris* of Ben Lawers, or granitic detritus of the Cairngorms, we should have a very different list of species, and in the case of the former a very much richer one. Such beautiful plants as *Solorina crocea* on Lawers, and *Platysma nivale* on Braeriach, with many others as rare if not so handsome, would reward the explorer of the Arctic-Alpine area of those mountains. A comparative list of plants from the various summits above 3000 ft. would provide exceedingly interesting matter for speculation.

References.

(1) A. G. Tansley and C. E. Moss: Types of British Vegetation. 1911.

(2) R. Smith: Botanical Survey of Scotland. Scott. Geog. Mag., 1904.

(3) W. G. Smith: Anthelia, an Arctic-Alpine Association. Scott. Bot. Review, No. 2, April, 1912.

(4) S. M. Macvicar: The Distribution of Hepatics in Scotland. Trans. Bot. Soc. Edin. xxv., 1910.

(5) C. B. Crampton: The Vegetation of Caithness considered in Relation to the Geology. 1911.

(6) J. Crombie: Grevillea, i. p. 62, and viii. p. 112.

(7) J. Crombie: Monograph of British Lichens, part i., 1894.

THREE CONIFERS.

By R. A. Dümmer.

Thuya (*Biota*) orientalis var. nov. mexicana Dümmer. In 1817 Humboldt, Bonpland, and Kunth (Nov. Gen. et Sp. ii. 3) described *Cupressus thurifera* from specimens collected at Tasco and Tehuilotepec in Mexico; it was subsequently detected by Uhde in Michoacoa and Oaxaca, and on the Sierra Madre by Seemann, and Hartweg averred having seen specimens of it 120 ft. high near Real de Monte; since that time it has remained undiscovered, and, as the paucity of herbaria material suggests, is one of the rarest of conifers.

Thirty years later Endlicher (Syn. Conif. 62) included this species in the genus *Chamæcyparis*, whence the name *Chamæcyparis thurifera*; but Masters having examined fragments of the original specimens, which are preserved in the Willdenow Herbarium, Berlin, and at Paris, restored it to its original position. In his critical account of the genus *Cupressus*, Masters (Journ. Linn. Soc. (Bot.) xxxi. 349) gives figures depicting leafy twigs and cones* of this plant, which in no way agree with *Cupressus lusitanica*, its variety *Benthami*, two cypresses with which it has been confounded.

While engaged on the conifers of the Lindley Herbarium, Cambridge, my attention was drawn to a small fruiting specimen labelled "*Chamæcyparis thurifera* Endl. 308, Culta. Sept. 5, 81. Orizaba," which suggested this long-lost plant. This particular specimen was described by Lindley himself as such in Gard. Chron. in 1856 (i. 772), and as his remarks are of interest, I here transcribe them:—

"There is commonly found in gardens throughout Europe a Mexican coniferous tree called *Cupressus thurifera*, under the supposition that it is the plant so called by Humboldt. Endlicher, however, pointed out the mistake, showing that the garden plant is a true Cypress, while that of Humboldt is a *Chamæcyparis*, and therefore he called the latter *Chamæcyparis thurifera*, giving the name of *Cupressus Benthami* to the wrong-named garden plant. Dr. Klotzsch had previously circulated the name of *C. Lindleyi* for the same thing. No two plants can be more different than *Cupressus Benthami* and *Chamæcyparis thurifera*—the first a true Cypress with numerous seeds to each scale of the cone—the second a *Chamæcyparis* with only two or one, and those not winged.

"But nobody seems of late years to have met with this *Chamæcyparis* in Mexico; even in the vast Herbarium of Kew it is not to be found. A few cones of a Cypress-like plant with roundish wingless seeds having, however, been received by the Horticultural Society, and raised in the Chiswick Gardens, further inquiry has led to the discovery that this Orizaba plant is in all probability the long-lost *Chamæcyparis thurifera.* Botteri sent them home without one word of information, but with a small dried specimen, from which we learn that he found it in a cultivated state. Being a true *Chamæcyparis*, and only one from Mexico being known to botanists, the inference that we have at last the true plant of Humboldt seems inevitable. In that great philosopher's work, above quoted, it is said to be a very tall resinous tree with spreading branches, whose timber is used for building purposes. The young seedlings in the Garden of the Horticultural Society are very glaucous, with almost the aspect of a *Thuya.* How far they may be able to bear this climate remains to be ascertained."

---

* The cones (fig. 27) are those of *Thuya* (*Biota*) *orientalis* var. *mexicana*—Botteri's cones, which are preserved at Kew and at Cambridge, and which Dr. Masters erroneously suggested might belong to this species.

Now, as the wingless character of the seeds of Lindley's specimen, in conjunction with the non-peltate nature of the cone-scales, excludes it from *Cupressus* and *Chamæcyparis* respectively, it must be a *Thuya*, and one which, though agreeing with *C.* (*Biota*) *orientalis* in its foliar characters, merits, on account of its peculiar cones and seeds, at least, in view of its reputed garden origin, varietal rank.

It might have been premised that these fruit distinctions would be ultimately correlated with peculiarities in the disposition or shape of the leaves, but such is not the case; the latter have remained stable, and show no salient points of distinction from *Thuya orientalis*, a plant of great horticultural age, which no doubt had even penetrated into so little known a region as Orizaba in Mexico, where possibly the change in edaphic and climatic factors evoked this mutant. Its cones are solitary, subsessile, light brown in colour, and subglobose and $\frac{7}{12}$ in. across, are composed of six non-peltate decussately arranged scales, which are slightly fused at the base, the larger outer being suborbicular, obovate or subrhombic in general outline, $\frac{1}{2}$–$\frac{7}{12}$ in. long, $\frac{5}{12}$–$\frac{1}{2}$ in. broad, with a small scarcely perceptible dorsal process, and slight longitudinal depression below it, their inner faces being marked at the base by the scars of attachment of one to three seeds; the inner scales are not narrower, narrowly obpyramidate and quadrangular, their apices flattish and slanting, with a small median process. The seeds are wingless, greyish brown and smooth, 4–6 mm. long, obliquely ovoid, obscurely 3–4 angled, bevelled on one side at the base, and opposite to this a semicircular lighter coloured scar. Hence the cones differ from typical *Thuya orientalis* in their smaller more globose shape, their light brown colour (no glaucous sheen being apparent), the different conformation of the scales, the absence of the horn-like dorsal recurved processes, so conspicuous a feature of the type, and the much smaller seeds, which in *Thuya orientalis* measure up to 8 mm. in length, and do not possess the peculiar basal bevelling characterising the latter.

The plants raised in the Chiswick Gardens from the seeds of this variety doubtless perished, for no *Thuya* bearing such cones has ever been alluded to in horticultural literature, as far as the writer is aware, but there is reason to assume that the variety existed on the Continent, for Carrière opines that the plant cultivated there as *Cupressus thurifera* was a *Biota*. Kent's description (Veitch's Man. Conif. 230 (1900)), based upon specimens received from La Mortola, apparently coincides with this rare species; but Mr. A. Berger, in a letter to Messrs. Henry & Elwes, states that this plant has disappeared and that two plants formerly cultivated under this name at La Mortola turned out to be *Cupressus sempervirens* and *C. lusitanica* var. *Benthami* (*C. Benthami*) respectively; similarly, seeds of *C. thurifera* distributed in 1909 by the Dendrological Society of France differed in no respect from those of *C. lusitanica*. Quite recently Mr. Clinton Baker has received specimens from Mons. J. Daveau of the Jardin des Plantes, Montpellier, under the name of *Cupressus thurifera*, which were collected in a cemetery of the State of Puebla, Mexico, by J. Nicolas (No. 9776) in January, 1911, but which Dr. Henry agreed with me must be assigned to *Cupressus* (*Biota*) *orientalis*. The latter specimens have therefore confirmed our suspicions as to the cultivated nature of the species in that region.

Two other cone-bearing specimens in the Lindley collection labelled *C. thurifera* Schlecht., collected between Angauguco and Italpuxáhua and Banco, are referable to *Cupressus lusitanica* var. *Benthami*.

Callitris neo-caledonica, sp. nov. The vegetation of the island of New Caledonia has been discussed by the French botanist Brongniart, by Professor Engler, and latterly in an able manner by Dr. R. Schlechter in Engler's Bot. Jahrbuch, xxxvi. (1905), who bases his observations upon several months' sojourn in the island. His sketch was subsequently followed by an enumeration and description (*op. cit.* xxxix. 1906) of the plants collected, among which many novelties occur; and the author lays special stress upon the advisability of exploring the north-west corner of the island, and the near-lying New Hebrides, regarding the flora of which our knowledge is regrettably deficient.

In view of the remarks which follow, it appears expedient to allude to Schlechter's remarks respecting the Conifers which obtain on the island. These are invariably confined to upper mountain-slopes between elevations of 1400–1500 metres above sea-level, only one, *Agathis ovata* Warburg, apparently affecting an altitudinal range from sea-level to 1300 metres, where, as solitary specimens, it is particularly abundant in the Serpentine Region. The Araucarias, of which *A. Balansæ*, *A. montana*, and *A. Muelleri* are cited, are among the tallest of the Conifers, rarely exceeding 35 ft. in height, and, being easily recognized by their distinct pyramidal aspect, form, in contradistinction to the remaining gymnospermous vegetation, small and nearly pure strands, especially in the south of the island; *Dacrydium* is represented by three species, *D. Balansæ* and the Yew-like and Araucaria-like *D. taxoides* and *D. araucarioides* respectively, which are scattered among woods of an Australian-Malayan element, chiefly composed of various Myoporums, Cunonias, Spiræanthema, Soulameas, Eugenias, and several Myrtles, &c. *Podocarpus gnidioides* remains dwarf, covers the ground, and in its prostrate and creeping habit mimics *Juniperus Sabina*; of other Podocarps, *P. minor* and *P. usta*, with broad spreading crowns, rarely exceed, like the *Dacrydia* and species of *Callitris*, 25 ft. in height. The latter are associated with the Podocarps and *Dacrydia* in the upper woods of the southern region of the island, and in exceedingly exposed situations remain dwarfed and shrubby. *Libocedrus austro-caledonicus* (*L. neo-caledonicus* of Schlechter) is seemingly rare; it was detected by Schlechter in the woods on the slopes of Mount Humboldt at elevations of 5300 ft. Three species of *Callitris* are cited, *C. Balansæ*, *C. sulcata*, *C. subumbellata*; the two latter were first referred to by Parlatore in the list of plants of the Florence Garden, and were subsequently described by him in De Candolle's *Prodromus* under the name of *Frenela*, where he cited specimens in Hooker's Herbarium. A reference to these shows that *F. sulcata* is based upon a fruiting specimen bearing scale-leaves, collected by Moore in New Caledonia, and communicated to Kew by Messrs. Veitch in August, 1862. *F. subumbellata* is founded upon specimens which were obtained on dry stony ground at the base of the mountain-ranges south-west of New Caledonia by an unnamed collector, showing both scale and primordial acicular leaves, the latter free and arranged in fours, the former in threes, and like those of Junipers fused. These specimens can in no way be regarded as specifically distinct from *F. Balansæ*, and agree with Balansa's specimens of *F. Balansæ* of Brongniart & Gris., which also exhibit both foliar phases and where their intimacy is remarkably well shown. The synonymy is as follows:—

CALLITRIS SULCATA Schlechter in Engler's Bot. Jahrb. xxxix. 16 (1906); *C. subumbellata* and *C. Balansæ* Schlechter, *l. c.* *Frenela sulcata* and *F. subumbellata* Parlatore, Enum. Sem. Hort. Florent. (1862), 23; in De Candolle Prod. xvi. ii. 446–447 (1868); *Frenela Balansæ* Brongniart and Gris. in Bull. Soc. Bot. Fr. xvi. (1869), 327.

Schlechter collected specimens of a *Callitris* on the mountains of Ngoye at elevations of about 3000 ft. in December, 1902, which he regarded as identical with *C. Balansæ*, but a critical examination precludes this and warrants their retention under a separate name; the salient points which distinguish this species from its congener lie in the short and moreover congested nature of the articulated twigs, the much shorter leaves with prominent dorsal convexities, and their denticulate not deeply and closely laciniate hyaline margins. The following is a description:—

Callitris neo-caledonica sp. nov. A tree about 25 ft. high with a broad crown; third year's branchlets stout, terete, rough, greyish brown, invested with the remains of the decurrent scale-leaves, current year's twigs short, articulated, 3-angled, leafy, 1–3 in. long, 1·7–2 mm. broad, ascending, fastigiate, densely crowded. Leaves (only homomorphic as far as is known) imbricate, scale-like, ternate, fused except their incurved triangular apices, averaging 3·5 mm. long, their dorsal convexities separated by shallow grooves; apices free, triangular, acute, their margin not hyaline but opaque and microscopically denticulate.

C. sulcatæ Schlechter affinis sed ramulis hornotinis articulatis brevibus valde confertis, foliis brevioribus, marginibus haud hyalinis vel laciniatis sed opacis minute denticulatisque differt. (Schlechter, 15179, Herb. Kew.)!

Podocarpus Motleyi Dümmer (comb. nov.). In 1857–8 Mr. James Motley collected specimens (No. 1300) of a Conifer near Bangarmassing (spelt also Bangermasin or Bandgermasin) in Southern Borneo, which he described as a large lofty tree with smooth yew-like bark, bearing the native name, "Kaju saribu dauni," meaning literally the "tree of a thousand leaves," in reference doubtless to its densely leafy crown. Some of these specimens fell into the hands of the celebrated Italian botanist Parlatore, who described and named the species *Dammara Motleyi* (without, however, seeing fertile material), in compliment to its discoverer.

Parlatore's original description occurs in his List of Seeds of the Florence Botanical Gardens for 1862 (published 1863), and synchronously, if not earlier in this Journal for Feb. 1863 (p. 36): Seemann (*l. c.*) in a footnote to Parlatore's description writes: "The genus must be considered doubtful, as the fruit is unknown. It may be a *Podocarpus*. Some time ago I asked the question in the *Gardeners' Chronicle*, how the Nageia section of *Podocarpus* could be distinguished from the genus *Dammara* in habit; and since then Mr. Charles Moore of Sydney has drawn my attention to the fact that the Dammara is leafy, even after the branches are several feet long, whilst in *Podocarpus* it becomes bare at a very early stage; and, as far as I have been able to observe, this distinction holds good."

This difference is decidedly apparent in specimens under cultivation: in the Temperate House at Kew the leaves are known to persist on the trunks of the various species cultivated there for 5–20 years; moreover, another constant obvious vegetative character separating these two genera appears to lie in the terminal buds; which in *Podocarpus* are narrowed and always pointed, while in *Agathis* (*Dammara*) they are without exception broad and hemispheric or depressedly hemispheric.

Messrs. Seward & Ford in their interesting account of the Araucarieæ, recent and extinct (Phil. Trans. cxcviii. 317 (1906)), confirm Seemann's suspicions, having made an anatomical investigation of the leaves; they say "the lamina, which is almost isobilateral, is characterised by the occurrence of resin canals between [below] the vascular bundles, and by numerous thick-walled fibres, with hardly any lumen below the epidermis. In this and other features the anatomy conforms to that of leaves of *Podocarpus Nageia*." Prof. Seward in a letter adds that in *Podocarpus* the resin canals of the leaves are below, in those of *Agathis* between the veins. Taking these views therefore into consideration, there can be but little doubt as to the correct status of *Agathis Motleyi*; and this was strikingly shown when in 1868 Parlatore (in DC. Prodr. xvi. 2, 508) described fertile material, which he did not recognise as of the same plant—collected by Beccari (No. 2649) between 1865 and 1868 in Sarawak, North-west Borneo—as *Podocarpus Beccarii.*

The following is a brief description of the plant, to which I have added its synonymy:—Current year's twigs short, subverticillate, distinctly pulvinate and narrowly ridged, terminated by narrow sharply acuminate buds, enclosed by 2–4 oval acuminately cuspidate denticulate-lacerate scales. Leaves opposite, ascending and hence overlapping, oval, acute, or shortly and sharply cuspidate, attenuate or rarely rounded basally, with a very short broad not twisted petiolar base; 1–1½ in. long, ½–¾ in. broad, coriaceous and rigid, doubtless dark lustrous green in the living state, indistinctly longitudinally striate when dried; margin not recurved. Male strobiles unknown. Females flowers disposed singly in the axils of the leaves, borne on a short, stout, $\frac{3}{10}$ in. long peduncle. Receptacles thickly fleshy, cylindric, damson-coloured. Seed globose, smooth and brownish with a slight glaucescent sheen, ⅗ in. in diameter.

PODOCARPUS MOTLEYI, comb. nov.

Dammara Motleyi Parlatore, Index Sem. Hort. Bot. Florent. 26 (1862); in Seemann, *Journal of Botany*, i. 36 (1863); and in De Candolle, Prod. xvi. ii. 377 (1868).

Agathis Motleyi Warburg, Monsunia, i. 185 (1900).

Podocarpus Beccarii Parlatore, *op. cit.* 508; Pilger, Taxaceæ, 59 (1903).

Podocarpus sp., Seward & Ford, in Phil. Trans. cxcviii. 317 (1906), with figure of leaf.

Nageia Beccarii Gordon, Pinetum, 186 (1875).

JOSEPH ANTHONY MARTINDALE.

(1837–1914.)

JOSEPH ANTHONY MARTINDALE, who passed away in his 77th year on April 3rd, was one of our ablest British Lichenologists, and was recognised as such on the Continent as well as in this country. He was born on July 19th, 1837, at Stanhope, in the Weardale Valley, Durham. His father moved soon afterwards to Durham, and became first mathematical master at Bede College, remaining there, however, only a short time, for when young Martindale was only eleven years old his father was conducting a private school at Sunderland, and lecturing and writing on agriculture and chemistry. Joseph, who was the eldest of seven children, at that age obtained a medal for chemistry, amongst youths of eighteen and nineteen, under the examination of a well-known professor, but his father, with a stern rectitude, forbade him to accept the medal, an act of probity which Martindale himself in later years used to refer to as rather hard upon him.

On his father's death, which occurred when Joseph was thirteen years old, he became a pupil teacher, was trained at the Battersea Training College, and was appointed to a school at Stanwix, near Carlisle, in 1857. On October 3rd, 1859, he came to Staveley as headmaster, an appointment which he held with great success until his retirement in 1902; after his retirement he continued to lecture under the County Education authorities. He was twice married; to Mary Ann Seed in 1861, and to Emily J. Ruthven in 1894, leaving six children by the first, and one by the second marriage. His eldest son, Mr. G. E. Martindale, inherits his father's botanical tastes.

Somewhat reserved with strangers, but of a kindly and unselfish disposition, Martindale took an active interest in politics and in the local management of the village, serving on the parish council and other bodies, acting as organist of the parish church, and joining in the Volunteer movement of 1878.

Physically he was active and vigorous, making all his journeys on foot when acting as inspector of religious instruction for the council schools of Westmoreland. Intellectually he was a man of considerable ability and determination, doing with the utmost thoroughness and precision everything he took in hand. His lichenological studies led him to acquire a mastery of the German language after he was forty years of age. French he knew well, and was thus able to correspond in their own languages with Arnold and Nylander.

Besides being a classical scholar, Martindale was familiar with Anglo-Saxon, and was versed in the Norwegian and Icelandic languages. He held strongly to Anglo-Saxon associations, and challenged the ultra-Norwegian theories held by some of the Westmoreland antiquaries, by material derived from local place-names. He was mainly instrumental in the discovery of an ancient British settlement at Millrigg, Kentmere, and in 1900 read a paper on the subject before the Cumberland and Westmoreland Archæological and Antiquarian Society.

His interest extended to entomology, geology, and osteology, and he was an old and honoured member of the Kendal Literary and Scientific Society and a member of its Council from 1903–1913.

Although best known outside his adopted county as a lichenologist, Martindale was a good all-round botanist. When he first took up the study of the botany of Westmoreland, he, with his usual thoroughness, collected all the records of plants of the period before Linnæus, from 1597 to 1774, availing himself largely of Mr. Harry Arnold's rich library at Arnbarrow: these he found to number 153 species. He then followed up the labours of Thomas Lawson in 1638, the Quaker schoolmaster of Great Strickland and father of Lakeland botany, who sent to his contemporary, John Ray, a list of 150 local plants, and of the stations in which they grew; and brought the records up to date by consulting those of Wilson and Hudson in the 18th, and Gough in the 19th century. Of the total number of plants, 1858, enumerated in the *London Catalogue* (8th edition), Mr. Martindale found records for 1023 in Westmoreland and Furness! But he was too conscientious to allow aliens and garden escapes to be recorded as natives, and thus reduced the number to 897 undoubted native species. In order to work out their distribution, he coloured the local map into six river basins, *viz.* the Leven and Duddon, the Kent, Lune, Eamont, Eden, and Tees, and the map

was published by Bartholomew. By the help of local botanists, he was able to give, besides his own list of 500 lichens and 138 fungi, a list of 360 mosses and 118 hepatics, besides algæ, diatoms and desmids, and brought the results before a local Natural History Society in 1888. His own herbarium contained about 2000 flowering and about 1000 flowerless plants.

Martindale appears to have begun the study of lichens about the year 1867, judging from a letter received from him February 25th, 1869, accompanying a series of north country flowering plants which he kindly sent for my herbarium, in which he says: "I have for the last two years done next to nothing among the phænogams, all of my spare time being fully taken up with the study of lichens, and I find that I make but very little progress with them. On looking over my collection I am astonished at the great number which I have determined, to which the mark of 'doubtful' is attached. Those I am certain of are very few in comparison."

During the next twenty years he evidently continued the study of the group until he mastered them, publishing papers on the Reindeer Lichen, and on the lichens of the *Placodium murorum* group, which showed a masterly grasp of the subject; as well as a list of the lichens of Westmoreland, in the *Naturalist* for 1886–87: this included many rare species, and several new to Great Britain. Among these latter were:—*Ephebeia Martindalei* Cromb., *Collema isidioides* Nyl. (Warton Crag, Cumberland), *Collemopsis oblongans* Nyl., *Calicium roscidum* Fkh., *Parmelia isidiotyla* Nyl., *Gyrophora spodochroa* Ach., *Lecanora flavocitrina* Nyl., *Lecidea acutula* Nyl., *L. declinascens* Nyl., *Platygrapha periclea* Nyl.

The progress of the list was arrested by the death of his first wife, which affected his own health; it will, it is hoped, appear in a complete form in the botanical section for the county (which, at my suggestion, Martindale was engaged to undertake) in the *Victoria History of the Counties of England.*

My first acquaintance with Martindale came through J. M. Barnes (1814–90) of Levens, Milnthorpe, a most genial and liberal correspondent, who in 1867 sent me Westmoreland mosses in exchange for those of Devon. This excellent bryologist told me that he, Martindale, and George Stabler (1839–1910) used to meet once a month at each other's houses, and then go out on exploring expeditions. This little group of botanists did much for the botany of the county, and their names are perpetuated in plants they discovered in the course of their work: Barnes, in *Bryum Barnesii* Wood; Stabler, in *Anthroceros Stableri* Steph., *Marsupella Stableri* Spruce, and *Plagiochila Stableri* Pearson; and Martindale in *Ephebeia Martindalei* Cromb.

Like the majority of practical lichenologists he was not a believer in the Schwendenerian theory. In a letter to me on February 20th, 1912, he writes: "The Schwendenerian theory creates more difficulties than it seems to solve. It is passing strange that lichen gonidia should so closely resemble algæ, but it would be much stranger that *Palmellaceæ* should remain for untold generations in an initial stage, without going on to complete their cycle or without dying away. This must be the case, if Schwendener is right, with many imprisoned 'algæ' in the thallus of lichens, that have never been known to fruit, and have therefore never imprisoned any algæ, since the original germination of the spores from which they came. There are several other things altogether independent of the question of gonidia, the chief of which is that the fertilisation is not effected as in the Ascomycetes, that is, if we accept as correct the statements of fungologists respecting them. I have myself microscopically examined thousands of apothecia, and scarcely ever limited my work to looking at and measuring the spores, but took in the whole organ. I have examined them in their earliest beginnings and there is nothing resembling a pollinodium. The fungi themselves are degenerate plants descended from some chlorophyllous parentage, and my belief is that lichens and ascomycetes descend from some common ancestor, but have diverged just as man and the ape have diverged in different directions from a common earlier type."

The Kendal Museum, of which Martindale was honorary curator, owes a great deal to his loving care of the herbarium, much of his valuable time having been spent in the preservation and arrangement of the fine collection there of the flowering and flowerless plants of the county.

E. M. Holmes.

SPARTINA TOWNSENDII Groves.

[The fifth volume of the *Proceedings of the Bournemouth Natural Science Society* contains a paper by Dr. Stapf on the above-named plant, originally delivered by him before the Society as a lecture in 1913. Dr. Stapf's previous paper on this interesting grass was reprinted in this Journal for 1908, pp. 76–81: the present contains much additional matter of interest as to the origin of the plant, some of which we here reproduce. The paper is illustrated by figures of *S. alterniflora*, *S. stricta*, and *S. Townsendii.*—Ed. Journ. Bot.]

Various theories have been advanced to explain the first appearance of the grass in the English Flora. The most plausible would seem to be that it was due to accidental introduction from a foreign country; but our present knowledge of the genus and its distribution does not support it. Another suggestion is that Townsend's grass arose as a sport or mutation from *Spartina stricta*, which formerly used to grow on the shores of Southampton Water. *Spartina stricta* is, however, a singularly uniform and conservative species throughout its area, rather receding than advancing, and slow in adapting itself to changed conditions. It is evidently not the material from which one might expect sports or mutations to spring, so distinct and vigorous as Townsend's grass.

There is, however, a third theory which is more plausible. According to it, Townsend's Spartina arose from a cross between *S. alterniflora* and *S. stricta*. *S. stricta* does not at present occur in the neighbourhood of Southampton or in Southampton Water; but we know for certain that it did so not very long ago. *S. alterniflora* is common in the Itchen River and also found in various places at the head and on both sides of Southampton Water. There was, no doubt, sufficient opportunity for the two species to hybridize. Unfortunately, it has not been possible so far to produce artificial hybrids of *S. alterniflora* and *S. stricta*. The evidence in favour of this theory is, therefore, necessarily circumstantial. It rests partly on the structure and the general behaviour of the grass, and partly on the occurrence of a natural hybrid between the same two parents in another part of the world and its extreme similarity to Townsend's grass. As to structural characters, there is no doubt that many of them may be considered as intermediate between those of *S. alterniflora* and *S. stricta*, although they are frequently, more or less, obscured by the remarkable readiness with which Townsend's Spartina responds to external conditions, now dwarfing down to the modest size of *S. stricta*, now running up to and even exceeding the height of fine examples of *S. alterniflora*. Similarly, its remarkable vigour, its pronounced instability, and its varying fertility, very much enhanced in certain years and almost suppressed in others, may be adduced in favour of the hybrid nature of the grass, as those conditions are traits frequently observed in hybrids. But the strongest evidence seems to be in the following fact:—*Spartina alterniflora* and *S. stricta* meet outside their English area only in one other place, namely, the estuary of the Bidassoa River, south of Bayonne, in the Bay of Biscay. There they grow intermixed, and among them has been found their hybrid. Foucaud described it in 1895, and named it *Spartina Neyrautii*, after its discoverer, Neyraut. Now this *S. Neyrautii* is so similar to *S. Townsendii* that Foucaud proclaimed both as hybrids from the same parents, explaining such differences as there are by the assumption that *S. alterniflora* was the female parent in the case of the Bidassoa cross, and *S. stricta* in that of the English plant. The fact is very remarkable, and the argument deducible from it for the hybrid origin of Townsend's grass has almost the force of experimental proof.

Thanks to its vigour and occasional fertility, Townsend's grass has, in a comparatively short time, conquered thousands of acres of bare mud-land, it has invaded and, in places, much reduced the beds of *Spartina alterniflora* in Southampton Water, and even attacked the marshes which so far have been the home of *Spartina stricta*. However, its principal domain is and will probably for ever be the mudflats from one to three feet below high water-mark. Here the changes brought about by Townsend's grass are remarkable. It is not only that the aspect of the flats is altered, the eye meeting great expanses of green comparable to meadows or cornfields, where there was previously a monotonous sheet of grey at low- and half-tide, also the animal life on the flats and their physical character is undergoing a change. To mention only a few economically interesting effects on the fauna: in more than one place the larger molluscs which were collected for food have disappeared; with the arrival of the grass, eel-spearing has been seriously interfered with, whilst even duck shooting has been spoiled owing to the birds finding a welcome cover in the dense grass belts. But the most important change concerns the physical condition of the flats. It is obvious that the copious systems of roots and stolons must contribute to the stabilisation and solidification of the mud. In addition to this binding action the stems and lower leaves and leaf-bases act as a very effective strainer on the water, which is charged with solid particles brought down by the streams, catching and precipitating them. The result is an accelerated and increased deposition of mud over the area tenanted by the grass. The level of the mudbank becomes raised, the mud itself firmer. Further, the decay of each year's growth enriches gradually the mud with nitrates and sulphides and other salts, and prepares it for the reception of types of vegetation which were until then excluded from it. On the land side of the Spartina belt, where there is only a foot of water at high-tide, a growth of *Aster Tripolium* and *Obione portulacoides* springs up among the grass, the first heralds of the reclamation of land that has set in. If the process continues, the muddy foreshore will gradually be replaced by *terra firma*. But another effect is more immediate, that of the protection which the grass affords to the shore behind it against the erosive action of the sea. The stems of the grass opposing themselves in their millions to the onrushing tides, to currents and the wind-driven sea, act like a natural breakwater to the shore behind them. It might be feared that the grass would become a nuisance to navigation by blocking up the waterways, but this is not the case. Bound to shallow water, it is not likely to invade the deeper water channels. On the contrary, the consolidation and gradual elevation of the grass-grown flats along them tends to increase the scouring action of the currents and tides on the sides and bottoms of those waterways, making their banks steeper and increasing their depth.

There is no reason why artificial plantations of Townsend's grass, under conditions corresponding to those of its native habitat, should not be successful. Propagation by division is easy, and the grass takes on well and grows rapidly, as experiments made in the Medway River and in New Zealand show.

When the grass is young, the leaves and stems are succulent and sweetish, and cattle and horses relish it. Several American species of Spartina are cut and fed to horses and cattle on a large scale. Analyses of Townsend's grass, made on behalf of the Board of Agriculture, show that for nutritious qualities it is quite equal to its American allies, and may be classed as a good average fodder grass. Other uses to which the grass has been put and might be put on a larger scale are for thatching, and, above all, for mulching. It has even been tried for paper-making, but with doubtful success.

SEX CHARACTER IN PLANTS.

[The following interesting summary of the experiments at Merton Park appeared in the *Times* of July 20.]

Work of great interest is now being done at the John Innes Horticultural Institution at Merton Park, where Professor Bateson and his staff are conducting investigations in genetics and in the problems of sex characters and hybridization in plants. The whole question of variations and mutation and the transmission of sex characters from one generation to another is not only one of the most fascinating of the day, but it may, perhaps, have the largest importance to humanity. The work at Merton Park is not scientific, in the sense that it has no immediate application to practical affairs.

When we interpret it into an effort to produce a truly disease-resisting strain of potatoes, to grow flax a foot or two taller than it has been grown before, and investigate the farmer's curse of thrips, to increase the fertility of fruit trees, to turn out beautiful new varieties of well-known flowering plants, then the work seems practical enough. The work is young yet; but every step gained, almost every series of experiments, adds some contribution, if only a negative one, to our economic knowledge. It is a pity that John Innes, who left his bequest for the foundation of a horticultural institution (and possibly had never heard the name of Mendel), cannot see to what excellent use his legacy is being put.

If you go into the fruit house at Merton Park you will find it full of fruit trees—apple, plum, and cherry—from three to five feet high, growing in pots. Certain kinds of these trees have been known to be self-sterile—that is to say, that they cannot be fertilized with their own pollen but must be fertilized with that from other varieties. Also it has now been discovered that some distinct varieties are not capable of inter-fertilization. It is evidently of the first importance to fruit growers to know what varieties when crossed produce the best results.

You will see here a tree, perhaps a cherry, which a month or two ago was a mass of blossom. There is a photograph to show what it looked like when every branch was covered equally densely with flowers. Now out of seven or eight branches five or six, it may be, are absolutely devoid of fruit. Two branches only are weighed down with clusters of ripe cherries. When the tree was in blossom the flowers on each several branch were carefully dusted with pollen from some other variety of cherry. The result shows which crosses were fertile and which were not. The method is not new; it has been developed in the United States, but the results obtained here are and will be full of interest to British fruit-growers.

In the flower houses sex investigations are being carried on by the crossings of begonias, calceolarias, nasturtiums, primulas, campanulas, and other flowering plants, and in calceolarias, especially, some quite new combinations of form and colour have been developed. Most of these are the results of experiments with *C. cana*, an unattractive, primitive-looking thing with woolly leaves which only a botanist would guess to be a calceolaria. So far as is known, *C. cana* has not heretofore been used in crossing; but some of the hybrids from it are of great beauty, tall branching plants of the "tree" type, of novel shades of mauve and lavender and other curious tints.

From the experiments with nasturtiums, again, some conspicuously handsome double flowers have been produced; one especially of a superb crimson-scarlet, and another almost equally handsome, banded with scarlet and yellow. In crossing the single females with double males, the doubles produced are hermaphrodite males and sterile females. The female parent being single, fertile females carrying the "double" character apparently do not result, at least to the second generation (F. 2). There seems to be some likelihood here of a clue to the nature of the double 10-weeks stock, of which, also, the double flowers are presumably sterile females. Meanwhile, some of these new flowers, mere by-products on the line of investigation, are singularly desirable flowers.

It is not possible here, even in outline, to indicate the trend of many of the experiments which are being conducted, the conclusions from most of which are at present most tentative. In working with begonias, after some years of experiment, the curious discovery was made, to the surprise of the discoverers themselves, that the ordinary exhibition type of double begonia is in many cases, if not in all, female. Some of the specimens carry ovules free on the petals. The discovery has necessitated the wiping out of the results of some four or five years of investigations which had been carried on on the supposition, as is the current belief, that the flowers were male.

Some very interesting suggestions are made, again, by the results of experiments with the varieties of the liliaceous plant *Chlorophytum*, which has leaves variegated in longitudinal stripes of yellow and green. From forms of which the middle of the leaf is yellow and the edges green it is found that the seedlings are yellow. Where the colours are reversed—green in the middle and yellow at the edges—the seedlings are green. That is to say, that the seedlings appear to carry the characteristics of the stem and midrib and not of the outer portion of the leaf. If this is constant, it would seem to throw a ray of light on the question of what portion of the soma or body of an organism it is from which the germ derives its character; a matter which may have an obvious bearing on inheritance in many things besides plants.

An exhaustive series of experiments has been made in colouration, using the common snapdragon or *Antirrhinum*, some of the results of which have been already embodied in scientific papers by the investigators. Briefly it has been found that all the combinations and variations of colouring in Antirrhinums are derived from four pigments—namely, ivory, yellow, red, and magenta. All of these have been isolated and obtained in a pure form, and the chemical identification of them is now possible. The first-named two pigments have been identified with apigenin and luteolin respectively.

This chemical interpretation of Mendelian factors may obviously be a matter of far-reaching importance. We can hardly imagine the possibility of tracing through the germ the principle which makes for longness or shortness in pea plants (as in Mendel's famous experiments), or which produces the rose comb or single comb in fowls; but we seem to be getting within reach of something more tractable when we deal with a common colouring matter of known constitution. The equation begins to be not all unknown quantities.

SHORT NOTES.

Ptilota plumosa and Henry Goode.—I had the pleasure of the personal acquaintance of Henry Goode, who is said by Dr. J. Cosmo Melvill (p. 107) to have collected *Ptilota plumosa* at Falmouth. He was a most enthusiastic collector, and for several years used to bring his algæ to me to name when he was in doubt. He lived at Plymouth as a centre, from about 1860–70, but went occasionally for a week or two to Falmouth and Penzance and other localities for seaweeds, and was lucky enough to find one or two pieces of *Carpomitra* at Penzance, and, if I remember rightly, also *Crouania* and *Gigartina pistillata.* He corresponded with algologists all over the world, and when he died left in his will, concerning his herbarium, that I was first to take all the specimens that I cared for, and that Mr. F. W. Smith, of Falmouth, was to have the remainder. The foreign algæ I selected from his collection formed the nucleus of my collection of foreign algæ now in Mason's College at Birmingham. I may say that Mr. F. W. Smith, who resided at Falmouth, sent Goode many beautiful specimens—he mounted specimens in albums for sale privately, and also sold loose specimens to collectors; the names were ascertained either from books or from correspondents, and both in his collections and in Goode's I often found specimens wrongly named, localities were often added afterwards by Mr. Goode from memory, as he often forgot where the specimens came from, when not labelled at the back by the collectors; Goode generally wrote the name in front of his specimens. I doubt, therefore, whether any reliance is to be placed upon the fact that Goode's specimen was labelled "Falmouth." I have visited Falmouth several times, but never saw *Ptilota plumosa* there: on the other hand, the Isle of Anglesea is quite a probable spot for it. I have gathered good typical specimens of *Phyllophora Brodiæi* at Penmon in Anglesea, and under the Menai Bridge, as well as *Phlœospora subarticulata* and *Chætopteris plumosa,* northern algæ which I have never seen in Devon or Cornwall; also *Cordylecladia* and other southern algæ at Penmon, so that evidently at this point the northern algæ find their southern limit on the West Coast, just as *Delesseria angustissima* finds its northern limit just below Scarborough, on the East Coast and southern algæ extend to Anglesea. *Ptilota plumosa* was recorded from Holyhead and Port Dafarch some years ago by Mr. J. E. Griffith, of Bangor, in his *Flora of Anglesea and Carnarvonshire* (p. 237), as growing on the stem of *Laminaria digitata.* The only satisfactory statement concerning the locality of an alga is when it is found actually attached to a growing plant, or a rock, as many weeds are floated for a very considerable distance before decaying, and floating algæ are always doubtful records from the spot where they are found. Even West Indian seeds are washed up in the Hebrides by the Gulf Stream.—E. M. Holmes.

Gaultheria Shallon in Surrey.—A specimen of this has been sent me by a correspondent, who describes it as growing on sandy soil at a high elevation on Leith Hill, Surrey, "apparently quite wild."—H. J. Riddelsdell.

REVIEWS.

A Monograph of the Genus Sabicea. By HERBERT FULLER WERNHAM, D.Sc., F.L.S. 8vo, cloth, pp. 82, with twelve plates and text-figures. Price 6*s.* London: British Museum. 1914.

WHEN volume iii. of the *Flora of Tropical Africa* appeared (1877), the genus *Sabicea* comprised nineteen species, a number gradually increased until, with the publication last year of the Catalogue of the Talbots' Nigerian Plants, forty-four species had been described. It speaks well for the thoroughness of Dr. Wernham's research that he has detected no fewer than sixty-two additional species, thus making the total number known to-day a hundred and eight. This result is embodied in the excellent monograph with its twelve well-executed plates now lying before us.

The nineteen pages of introduction are full of interesting reading, and, provided the author's views on the derivation of the various groups are regarded as suggestions merely as to what may have happened—and this is all that is claimed for them—it must be admitted that they are plausible and proferred with much ingenuity. The main grouping of the species is founded upon the inflorescence, the earliest form of which the author supposes to have been the open cyme, from which has been derived the condensed head, and finally the head surrounded by an involucre of bracts. The difficulty in this matter of descent is that we do not know whether unchecked advance from the simple to the more complex really has occurred in the history of any group of organisms. Thus, to take one case—a case with direct bearing, as it happens, upon the point in question. The head of *Compositæ* is allowed by all to be the highest expression of effectiveness in floral arrangement; yet there are genera, undoubtedly derived from *Compositæ* of normal type, in which the head is reduced to two or three florets, or even a single floret in a scattered inflorescence, thus harking back to a very primitive state of things. The truth is, we know little at present about the phylogeny of Angiosperms, and still less about that of their genera and species, and so far ontogeny cannot be said to have proved of much use in enlightening our ignorance. This, however, should not deter monographers from giving us their conclusions, for speculation can do no harm, provided its true nature be kept in view.

Dr. Wernham's key has been carefully constructed, and the species should be easily recognisable from it. We notice, too, a very good point, one unfortunately not always present in recent monographs, *viz.* the citation of the herbaria where the various species may be found. We cannot, however, refrain from mentioning that in some cases the full nomenclature has not been given. For instance, a Brazilian plant was considered in the *Phanerogamic Botany of the Matto Grosso Expedition* to be conspecific with *S. novo-granatensis* K. Schum. Dr. Wernham finds this to be a mistake, and he describes the plant under a new name without reference to the erroneous identification. This is, however, scarcely a matter of primary importance, and we may hope that in further monographs of *Rubiaceæ* which we are promised from the same pen full citations will appear. But we are not disposed to be any less warm on this account in congratulating the author on the capital piece of work he has turned out.

S. M.

The Standard Cyclopedia of Horticulture. By L. H. Bailey. Vol. i. A–B. 4to cloth, pp. 602. 700 figures in text. New York: Macmillan & Co. 1914. 25*s.* net.

This work, which is to be completed in six volumes to be illustrated with coloured and other plates, with four thousand engravings in the text, contains contributions from most of the leading horticulturists and botanists of America, all of them experts in the particular subjects on which they write. We learn from the preface that the work "discusses the cultivation of fruits, flowers, and garden vegetables in the United States and Provinces." In style, it is similar to the *Cyclopedia of American Horticulture* published fourteen years ago, but the treatment in the earlier work was confined closely to "the trade"—to those plants "sold in the United States and Canada"; in the present, "the trade" is interpreted more liberally, and includes the species offered and supplied to American customers by many European dealers. The horticultural possibilities of the various States are outlined, and biographies of eminent horticulturists are given.

The first part contains a synopsis of the vegetable kingdom, based on Engler's system, with a key to the families and genera arranged according to the *Genera Plantarum* Bentham & Hooker. It seems illogical to employ the two systems used in the same work. The real reason for the key being on Bentham and Hooker's system is that it was prepared for the former Cyclopedia: an additional reason is that "the new system is better adapted for showing relationship or likeness, while the old system is well adapted for bringing out differences: most of those who use this part of the Cyclopedia will probably be in search for differences."

A list of English equivalents of the Latin names and a glossary of botanical and horticultural technical terms are appended. We read in the preface: "It is impossible now to know how many wrong determinations, inaccurate and insufficient descriptions, and faulty judgments, have been perpetuated from author to author through long series of years. . . . The best that can be done in very many cases is to accept the name appearing in a catalogue, and to attach to it the most authentic or most adaptable description of a recognised botanical species of the same name; there is no telling whether the dealers' plant is properly determined or whether it represents the botanical species bearing the same name." It would seem that the scientific horticulturist meets with the same difficulties in America as we do in this country. There is no reason why a nurseryman should not have pet names for his plants, even though these may have some semblance to real botanical names; but the free manner in which names are printed in catalogues has resulted in what can only be described as chaos. Names are given which have no application to the plants described, and sold as such: the names of others sometimes look as if they were taken from one of the old herbals.

A condensed description of each genus is given, followed by the native localities. The descriptive portion is characterised by the excellence which we always expect, and never in vain, to find in Mr. Bailey's work. Keys to the species are added, arranged primarily to aid the gardener in making determinations. The species are arranged systematically, and, where necessary, an alphabetical index is supplied for rapid reference: a list of synonyms and references is appended. The descriptions are excellent: although the editor hopes "that every entry will be worked over and improved within the next decade," the book is as authoritative and excellent as it is possible to be. The compilation is comprehensive, and the treatment of modern theory and practice exhaustive.

The book is clearly printed on good paper, and well and neatly bound. The illustrations are clear and to the point, though some are of little artistic merit. As a Cyclopedia it stands far above anything we have seen, and the publication of the succeeding five volumes will be looked forward to with interest.

J. K. Ramsbottom.

The Banana: its Cultivation, Distribution, and Commercial Uses. By William Fawcett, B.Sc. 8vo. Pp. xi. 287, tt. 17. London: Duckworth. 1913. Price 7*s.* 6*d.*

Mr. Fawcett is to be congratulated on the appearance of a useful and much-needed handbook. It embodies the experience gained during his twenty-one years' residence in Jamaica as Director of Public Gardens and Plantations, a period during which the value of the bananas exported from the island increased from £250,000 to £1,000,000. To the results of his own experience Mr. Fawcett has added those of an exhaustive study of the literature of his subject, including the cultivation of the fruit in the Tropics generally.

The banana is the product of cultivated varieties of three species of *Musa*—*M. sapientum*, cultivated extensively in Jamaica and Central America and also in Malaya; *M. Cavendishii*, the smaller and more delicate-tasting Canary Island banana; and *M. acuminata*, grown in Malaya. The plantain, a much larger fruit, used cooked before it is ripe instead of bread or potatoes, is the product of another species, *M. paradisiaca*. Plantains are not exported to Great Britain, and, as Mr. Fawcett remarks, "they are not much wanted in countries where potatoes are plentiful and much cheaper, and are more valuable than bananas in the countries where they grow." After a preliminary chapter giving a full account of the structure of the plant-root, stem, leaf, flower and fruit, a number of chapters are devoted to its cultivation, including the question of manures and fertilizers, with a short chapter on the financial aspect and some advice to those about to cultivate. Fungus diseases and insect-pests are described in detail and remedies suggested. The economic use of the banana provides material for several chapters, from which, apart from its well-known value as a food, it appears to have medicinal value, and also to be worth consideration as a source of alcohol. The author does not, however, encourage any hope of its competing with *M. textilis* and other species as a source of fibre. An interesting account is given of the development of the banana trade and the manner of transport of the fruit by sea and land; and a useful series of chapters is devoted to a general review of the cultivation of the banana and plantain in various parts of the Tropics. The last chapter is a systematic botanical account of the species of *Musa*, nearly seventy in number, each of which is briefly described. An appendix supplies a few recipes for cooking bananas.

A. B. R.

Die Süsswasser-flora Deutschlands, Österreichs und der Schweiz. Heft 1: Flagellata I., von A. Pascher und E. Lammermann. Jena. 1914.

This volume will prove a useful and reliable key to the Pantostomatinæ, Protomastiginæ and Distomatinæ. It is a fitting complement to Part II. of the Flagellata already issued. Pascher contributes the introductory remarks and Lammermann the important systematic part. The figures are reasonably good, but the descriptions are in many cases very brief, with no critical remarks and no distribution. One fails to see why scores of species should be included in a flora of Germany, Austria and Switzerland, with the remarks "Bislang nur aus Nordamerika," &c. It implies that all Flagellates have a world-wide distribution, whereas there is much evidence to the contrary.

Heft 6: Chlorophyceæ III., von W. Heering. Jena. 1914.—This part includes the Ulotrichales, Microsporales and Œdogoniales, and it is the best of the series yet published. The descriptions are good, but the figures, more especially in the Chætophoraceæ, leave much to be desired. The general account of the genus *Microspora* is incorrect, both in the cytology and formation of zoogonidia. Once more many genera and numerous species are included which should have no place in a Flora of Central Europe. Some American and even African genera and species are described and figured, none of which are known to occur, and most of which are never likely to occur in Europe. Inclusions of this kind are positively harmful and misleading, although apparently quite in keeping with the German character. Dr. Heering's treatment of the species of many of the genera is excellent and is accompanied by considerable critical observation. On the whole, this little volume will prove a useful, if small, laboratory guide.

G. S. West.

BOOK-NOTES, NEWS, &c.

One of the recently issued parts of the *Records of the Botanical Survey of India* (vol. vii. No. 1) is devoted to the first portion of what is evidently a very thorough and exhaustive study of the Flora of Aden, by the Rev. Ethelbert Blatter, S.J., F.L.S., Professor of Botany at St. Xavier's College, Calcutta. Beginning with a history of the botanical exploration of Aden, with an account of what has been done by previous workers (with brief biographies), the physical aspects of the region—area and position, geology, topography, and conditions of plant-life are considered: an account of the vegetation follows, which includes its general aspects, with notes on its origin in the Indo-African desert and the North African steppe, and of the means of dissemination by wind and water and by the agency of animals and man. The systematic portion, with synopsis of orders and description of species, will appear later. This part contains one large and excellent map and five illustrations of the town and people.

The other recent parts of the *Records* contain reports on the Mosses of the Abor Expedition (1911–12) and on Mosses collected by Mr. C. E. C. Fisher and others in South India and Ceylon, by Mr. H. N. Dixon; this (vol. vi. No. 3) contains two excellent plates and descriptions of numerous novelties. In No. 4 of the same volume Messrs. G. H. Cave and Mr. W. Smith write on the East Himalayan species of *Alangium*, and the latter describes new species from the Calcutta Herbarium.

We regret to find that we neglected to notice two papers reprinted from the *Transactions of the Devonshire Association for the Advancement of Science, Literature and Art*—surely some shorter name might have been devised?—for 1913. In one of them Miss C. E. Larter gives a careful account of the distribution of *Viola* in Devonshire, in which she has had the help of Mrs. Gregory for the *Nomimium* and of Dr. Drabble for the *Melanium* section: to the latter *V. meduanensis* Bor. is added, which has not previously been recorded for Britain. In the other paper Mr. Hiern edits the Fifth Report of the Botany Committee, which contains numerous additional species and localities for each of the eight districts into which the county has been divided.

The first of the series of six volumes entitled *The Oxford Survey of the British Empire* (Clarendon Press) is devoted to the British Islands and Mediterranean possessions; to this Dr. Moss contributes a general account of the distribution of British plants and correlates Forbes's and Watson's work with that of recent Continental authors, as well as with that of Mr. Clement Reid.

The most recent addition to the "Bibliothèque Scientifique Internationale" is a treatise on *La Vie et la Lumière*, by Dr. Raphael Dubois (Paris, Librairie F. Alcan; price 6 francs). The first chapter is devoted to "les végétaux lumineuses" as represented by the genus *Photobacterium*, on which the author has made various experiments; it is illustrated by a curious "photographie du buste de Claude Bernard éclairé par la lumière des Photobacteriées."

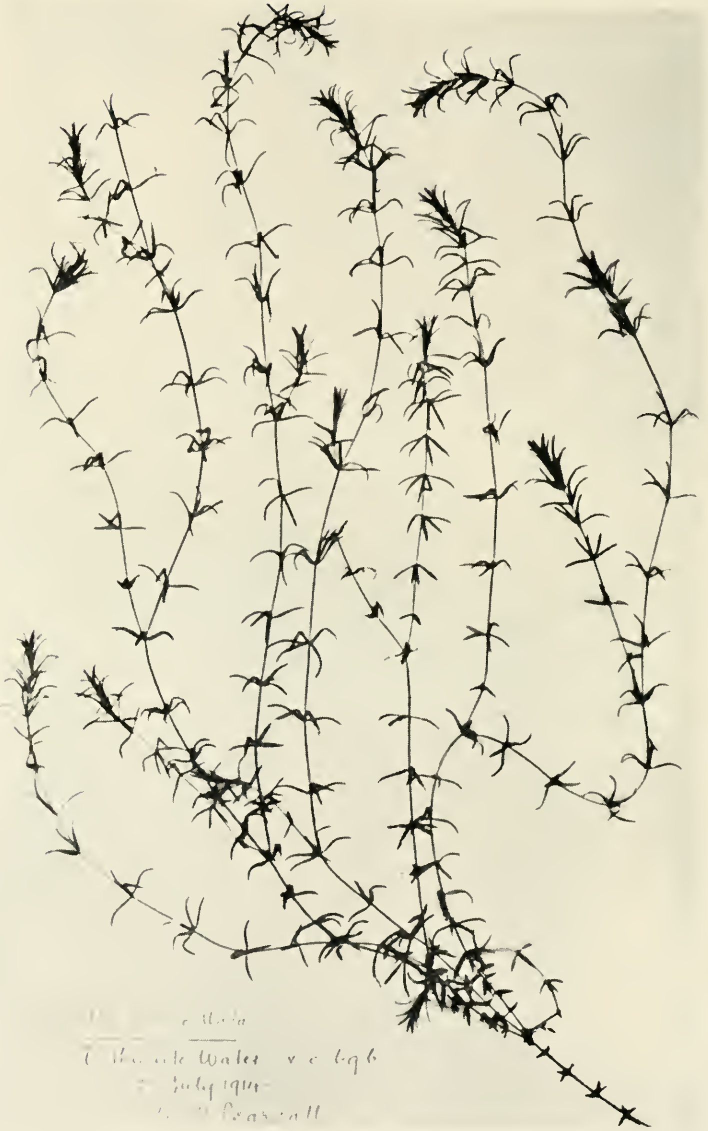
Mr. F. Diemer, of Cairo, has published a pretty little book containing some thirty pictures, reproduced from photographs of *Some Desert Flowers* by Mrs. Grace M. Crowfoot, to which are added brief descriptions based on those in Muschler's *Manual Flora of Egypt*. There is an interesting introduction dealing with the characteristics of the Flora. The price of the book is not stated; the copy before us is announced in violet ink on the title-page as "Gratuit pour la redaction," and the publisher adds to his generosity by sending a ready-written review, of which we do not propose to avail ourselves further than by agreeing that "with this book in hand a good many of the commoner of the flowers growing near Cairo can be readily identified."

Dr. Stapf contributes to the supplement to vol. 50 of the *Botanische Jahrbücher* an important paper on "The Southern Element in the British Flora." We regret that a paper of such special interest to British botanists should appear in a German periodical with which few, if any of them, are likely to be acquainted.

A note in the *Selborne Magazine* for August, signed "K. M. Styan," records the finding, in August, 1913, of "a tiny patch" of *Asperula nitida*, "not very far from the summit of Ben Nevis." The identification has been verified at the National Herbarium, where a specimen of the plant has been placed. *A. nitida* is a native of Asia Minor, "now cultivated somewhat in English gardens." Although the writer of the note thinks the view that it was planted there is "too ridiculous to credit," we have little doubt that its occurrence is to be thus explained: it is, we believe, well known that attempts have been made to establish plants upon the Scottish mountains as elsewhere, and this seems to be one of the few occasions on which the attempt has proved successful.

A series of papers on "The Flora of the Brent Valley Bird Sanctuary," by Mr. J. C. Shenstone, appeared in the *Selborne Magazine* during 1913.

Vegetationsbilder von Kilimandscharo, by Dr. Gertrud Tobler-Wolff and Dr. Fr. Tobler (Jena, Gustav Fischer, 1914), forms Parts 2 and 3 of the twelfth series of the "Vegetationsbilder" edited by Professors Karsten & Schenk. The letterpress accompanying the plates explains in an admirable way the various features of the district visited by the authors. The plates themselves are well executed and, although encumbered with the embarrassing excess of detail and want of individual definition common to similar photographs, give an excellent idea of the scenery depicted. Special mention may be made of plate 7 (*Leonotis mollis* Benth), plates 9 and 10 (giant Lobelias), plate 12 (Heaths), and plate 17 (Helichrysums). This is altogether a valuable addition to this series of botanical photographs.


Water v. c. 69b
July 1914
Pearsall

HYDRILLA VERTICILLATA Casp.

HYDRILLA VERTICILLATA Casp. IN ENGLAND.

By Arthur Bennett, A.L.S.

(Plate 534.)

Hydrilla verticillata Caspary in Bot. Zeit. xiv. 899 (1856).
H. ovalifolia Rich. in Mém. Inst. Par. xii. (1811).
Udora verticillata Gorski in Eich. Skizze. v. Lithuan., &c., 127 (1830).
U. lithuanica Besser in Flora 11. Beibl. 12 (1832).
U. occidentalis Koch, Syn. ed. 1. 669 (1837).
U. pomeranica Reichb. Icones f. 104 (1845).

This interesting addition to the British Flora has been found by Mr. W. H. Pearsall in Lake Lancashire, v.-c. 69 *b*, at Estwaite Water, growing with *Naias flexilis*—itself an occurrence of note—*Elodea canadensis*, *Potamogeton Sturrockii*, *P. pusillus* and *Callitriche autumnalis*. The "Water" where the plant occurs is rich in aquatics, and Mr. Pearsall suggests that this may be due, among other causes, to the number of water-fowl that frequent it—wild ducks, coots, water-hens, &c.—by the score. The English examples seem to be produced from winter buds, the first leaves being opposite, then gradually producing leaves in threes and fives (occasionally fours) at each node; they are linear-acuminate, pellucid, with small cells on the leaf-margins which can hardly be called serrations, as they seem to be extra-marginal—not as shown in *Elodea* in *English Botany*, ed. 3, ix. t. 1446.

The following description is given by Sir J. D. Hooker (*Flora of British India*, v. 659):—

"A submerged leafy diœcious herb. *Leaves* short, 3–4-nately whorled, or the lower opposite. *Male flowers* solitary, stoutly pedicelled, in a subglobose sessile muricate spathe; sepals 3, ovate or obovate, green; petals 3, oblong or cuneiform; stamens 3, anthers large, reniform, opening elastically; pistillode small. *Female flowers* 1–2, sessile in a tubular 2-toothed spathe; perianth of the male, but leaflets narrower; ovary produced beyond the spathe in a filiform beak, 1-celled; styles 2–3, linear, undivided; stigmas 3, fimbriate; ovules anatropous. Fruit subulate, smooth or muricate; seeds 2–3 oblong, testa shortly produced at each end.

"Plant forming large masses. Leaves $\frac{1}{4}$–$\frac{1}{3}$ in., 4–8 in a whorl, with a short sheathing one at the base of each branch and a short pair above this; linear or oblong-linear, serrulate or entire. Flowers $\frac{1}{6}$–$\frac{1}{4}$ in. long; perianth segments very variable. Fruit smooth or sometimes muricate, or (in Ceylon) squarrose with filaments above the middle. The male flowers escape from the sheath when mature, and float to the top of the water."

I have followed Ascherson and Graebner (Syn. Mitteleur. Fl. i. 399) in adopting Caspary's name for the plant. The genus is near *Elodea* and *Anacharis*, and perhaps all three should be included under one. The plant has been found in Europe in

Pomerania, S.E. Prussia, Russia (in the governments of Wilna, Kurland, and Witebsk) and E. Asia, Australia, Mauritius, Central Africa, and Madagascar. Whether it is indigenous in Europe is doubtful: Nyman (Consp. Fl. Europ. Supp. ii. 285 (1890)) remarks: "Patria hujus plantæ est India orient., ubi frequens dicitur." If not indigenous, it is not easy to suggest how it has become distributed, unless the seeds become attached to the feet of aquatic birds, many of which range widely over the world. The suggestion that it is carried in their crops seems not admissible, as Danish ornithologists have shown that, as a rule, birds in migration travel with empty crops. The plant occurs also in Tropical Asia, Tropical Africa, the Mascarene Islands, and Australia.

The occurrence of *Naias* in the same lake is also remarkable. We now have this species in Ireland, Scotland, and England; for its distribution in Ireland and Scotland see Trans. Bot. Soc. Edinb. xxiv. 16 (1909). In Europe it is rare, being recorded in Finland!, North Russia, Sweden in Scania! and formerly in Upland, North Germany (Binow-See and Paarsteiner-See), Pomerania and Lithuania. It is generally distributed in the United States and Canada. Hooker (Stud. Fl. ed. 3, p. 439 (1884)) gives "Asia," but Dr. Rendle names no Asian stations in his revision of the genus in Trans. Linn. Soc. (Botany), vol. v.

The accompanying plate is from a photograph kindly supplied by Mr. W. H. Pearsall.

THE INDIFFERENT COILING OF ARUM SPATHES.

By Miller Christy, F.L.S.

It is now over thirty years since I first observed the fact that the spathes of the common Cuckoo-pint (*Arum maculatum*) are coiled or rolled indifferently either way in different individuals—a fact which I have not seen noticed in botanical literature, except in a brief note by myself published in this Journal for 1883, p. 237. The same is the case with the flowers of the common greenhouse "Arum-lily" (*Richardia africana* or *Calla æthiopica*). The peculiarity is common, probably, to all the Aroidæ.

Later, I observed that the leaves of *A. maculatum*, on their first appearance above ground, are also coiled or rolled indifferently either way, and that all the leaves on any one plant are always coiled or rolled the same way as the flower-spathes on that plant. This is, after all, merely what might have been expected; for a spathe is no more than a modified leaf or bract.

It may be asked, perhaps, how it is possible, without great difficulty, to substantiate the statement that all leaves and spathes on any one plant are always coiled or rolled the same way, seeing that the leaves regularly appear at least two months, and often more, before the tips of the spathes are visible above ground and that they uncoil very soon after their appearance. In reality, however, substantiation is easy; for, when even the earliest leaves first appear above ground (which is often as early as January or February), the spathe is already fully formed, though, of course, very small and still entirely below ground. By pulling up the plant and splitting it open, one can easily ascertain, even at this early stage, which way its spathe is rolled.

The facts noted in connection with the æstivation of the leaves and spathes of the Arum have long seemed to me curious and anomalous; for Nature does not, as a rule, leave matters of this kind to chance (so to speak). In most similar cases, she follows some definite rule for each species or each genus, as the case may be. Thus, among climbing plants, a majority (as the White Convolvulus and the Scarlet Runner) revolve their shoots and tendrils in one definite direction, while others (as the Hop and Honeysuckle) revolve in the opposite direction.* Darwin observes † that, in almost all climbing plants, members of the same genus revolve their shoots and tendrils in the same direction. The same is true, I believe, of the æstivation of the flowers and leaves of all plants having flowers or leaves which are coiled or rolled in their earlier stages—that is to say, in each species or genus, the flowers or leaves are regularly coiled or rolled either one way or the other: not either way indifferently. Again, among mollusca having helically- or spirally-coiled shells, a large majority of species coil in one definite direction, though some species coil in the opposite direction. In most species of mollusca, however, one meets occasionally with abnormal individuals coiled in that direction which is opposite to the direction normal in the species—a peculiarity which is much commoner, for some unexplained reason, in some species and in some localities than in others.‡ The case of the spathes of *A. maculatum* is, however, totally different from any of the foregoing cases; for, as stated already, the spathes of this species are coiled or rolled *either way indifferently*. Similar cases are, I believe, rare in Nature.

In view of these facts, it occurred to me, several years ago, that it might be worth while to undertake investigations with a view to ascertaining whether plants of the Arum, having leaves and spathes coiled either in one direction or the other, occur in Nature in about equal numbers; or whether plants having their leaves and spathes coiled in one direction or the other are in a majority.

Accordingly, I began a series of investigations, which I continued at intervals for five years. During country walks or in odd moments wherever I happened to be (often in shrubberies attached to my own garden), I gathered spathes of the Arum, afterwards counting and recording the number of each kind I had secured. In all cases, I gathered one spathe only from each plant. Further, to secure a more reliable result, I abstained usually from gathering more than one spathe from two adjoining groups of plants, whenever it seemed likely that both groups had grown from the seed of one parent plant. In this way I have gathered and counted either spathes or leaves or both from no fewer than 1228 plants—a number large enough, I think, to enable one to arrive at a fairly definite conclusion on the point at issue. The results of my counting are set forth in detail in a tabular statement which follows.

---

* See Darwin, *Climbing Plants*, 2nd ed., pp. 23–35 (1875), and Dr. B. Daydon Jackson, *Glossary of Botanic Terms*, 2nd ed., p. 367 (1905). The majority revolve in the direction which Darwin calls (*op. cit.*, p. 33) "against the sun."

† Darwin, *op. cit.*, pp. 33–34.

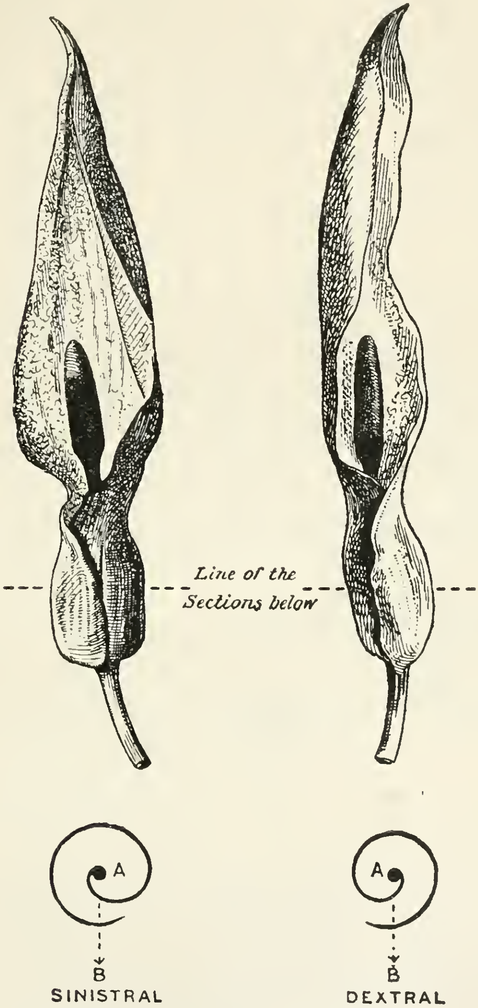
‡ See J. W. Taylor, *Monograph of Land and Freshwater Mollusca of British Isles*, i., pp. 23–24, 108–109 (1900).

Before examining those results, however, it is necessary to find terms capable of expressing, definitely and without ambiguity, the two directions in which the spathes and leaves of the Arum are rolled or coiled. For this purpose, I employ the terms "dextral" and "sinistral." These are, I hold (for reasons I hope to set forth elsewhere), the *only* terms capable of being used in such case without liability to confusion. Let the observer imagine himself to be standing upright, within the spathe (or, better still, within the central stem or axis), facing and looking out of the opening of the spathe. If, in that case, the wing of the spathe, on leaving the central stem or axis as it begins to coil, passes first to the observer's right hand, that spathe is what I call "dextral." If, on the contrary, it passes first to the observer's left hand, the spathe is what I call "sinistral." (It should be remembered that, if the observer imagines himself to be *outside* the spathe and *facing* its opening, the conditions are exactly reversed.) The annexed illustration shows a dextral and a sinistral spathe of *A. maculatum*, as well as a transverse section through the "bulb" of each, the sections being viewed, of course, from above. In each case A represents the central stem or axis (within which the observer is supposed to be), and B the point he is supposed to face as he looks out of the opening of the spathe.

Turning now to the results of my counting, as shown in the tabular statement annexed, it will be seen that, of 1228 Arum spathes, gathered at random, on thirty-two different occasions between 25th April, 1909 and 10th May, 1914, from hedgebanks, roadsides, ditches, and woods, at various places, chiefly in Essex and Gloucestershire, 645 proved to be sinistral and 583 to be dextral—a majority of 62 for the sinistral spathes. It is clear, therefore, that, among the 1228 spathes examined, the sinistral spathes stood to the dextral spathes in the same relation that 100 stands to 90. In other words, the sinistral spathes outnumbered the dextral spathes by about 10 per cent.

It is worth noting that we get much the same result if we take the results of the thirty-two observations separately. Thus, no fewer than nineteen (or about 60 per cent.) of these observations yielded a majority of sinistral spathes; only eleven (or about 34 per cent.) yielded a majority of dextral spathes; while in two the numbers of each kind of spathe were equal.

The numbers of observations made and of spathes counted are, admittedly, not large. Nevertheless, the numbers appear to be sufficiently large to prove conclusively that, in Nature, sinistral spathes are really and persistently more numerous than dextral spathes. It is significant that this is demonstrated by the results of the thirty-two observations, each being taken separately, and by the total result of the observations, all being taken together.



Spathes of *Arum maculatum*, and sections thereof.

It might be interesting to speculate as to whether this small, though marked, majority of sinistral spathes is a feature which is in course of being acquired or in course of being lost. It would

Arum maculatum: Observations on the Indifferent (Sinistral or Dextral) Coiling of its Spathe.

No. of Obs.	Date	Locality	Situation	No. of Spathes Exd.	No. of		Majority of		Proportions.[*]	
					Sin.	Dex.	S.	D.	S.	D.
	1909									
1	April 25	Chignal St. James, Essex.	Garden.	6	5	1	+	—	100	20
2	May 9	Writtle, Essex.	Ditches & banks.	112	60	52	+	—	100	87
3	,, 9	,,	,,	13	9	4	+	—	100	44
4	,, 23	Chignal St. James.	,,	32	14	18	—	+	78	100
5	,, 23	,,	,,	6	4	2	+	—	100	50
	1910									
6	May 1	,,	,,	31	21	10	+	—	100	48
7	,, 1	,,	Wood [†]	12	6	6	equal		100	100
8	,, 1	,,	Woods [†]	12	8	4	+	—	100	50
9	,, 1	,,	Ditches & banks.	10	4	6	—	+	67	100
10	,, 1	,,	,,	39	20	19	+	—	100	95
11	,, 14	Cirencester, Glos.	,,	44	21	23	—	+	91	100
12	,, 15	Nailsworth, Glos.	Wooded hillside.	20	11	9	+	—	100	82
13	,, 16	Stroud, Glos.	Roadside banks.	52	25	27	—	+	93	100
14	,, 21	Rivenhall, Essex.	Churchyard.	76	33	43	—	+	77	100
15	,, 22	Stisted, Essex.	Ditches & banks.	33	19	14	+	—	100	74
16	,, 22	Pattiswick, Essex.	,,	10	7	3	+	—	100	43
17	,, 28	Little Baddow, Essex.	Roadside bank.	17	10	7	+	—	100	70
18	,, 29	Chignal St. James.	Ditches & banks.	64	35	29	+	—	100	83
19	June 5	Ashdon, Essex.	Wood.	3	1	2	—	+	50	100
	1911									
20	April 23	Saffron Walden and Debden.	Woods, &c.	18	9	9	equal		100	100
	1912									
21	April 8	Hoxne, Suffolk.	,,	17	8	9	—	+	89	100
22	May 5	Chignal St. James.	Broom Wood.	104	55	49	+	—	100	89
23	,, 19	,,	Broom Wood & ditches.	41	26	15	+	—	100	58
	1913									
24	May 4	,,	,,	23	11	12	—	+	91	100
25	,, 8	,,	,,	27	17	10	+	—	100	59
26	,, 8	,,	,,	74	33	41	—	+	80	100
	1914									
27	April 13	,,	Banks & ditches.	47	30	17	+	—	100	57
28	,, 28	,,	Broom Wood.	76	34	42	—	+	81	100
29	,, 28	,,	Banks & ditches.	59	30	29	+	—	100	97
30	May 2	Saffron Walden.	Chalk-pit.	54	31	23	+	—	100	74
31	,, 3	Chignal St. James.	Banks & ditches.	70	38	32	+	—	100	84
32	,, 10	,,	,,	26	10	16	—	+	62	100
				1228	645	583	19	11	100	90
							and two equal			
							32			

---

[*] Decimals ignored: the nearest whole number taken.

[†] All from one cluster: grown, probably, from the seeds of a single flower.

be of interest, too, to ascertain by experiment whether the rolling of the spathe constitutes what is known as a Mendelian character. Herein, however, I propose to do no more than place on record the facts observed.

The number of similar cases which occur in Nature is, I believe, small. Darwin records[*] that the Woody Nightshade (*Solanum Dulcamara*), a plant with exceedingly feeble climbing powers, revolves its shoots and twines indifferently in either direction. He mentions[†] also one or two other more or less similar cases among climbing plants.

THREE NEW COMPOSITÆ FROM PERU.

By Albert Hanford Moore and Spencer le M. Moore.

During a recent visit to South America Mr. H. O. Forbes made a small collection of plants in Peru, and upon his return presented them to the British Museum. The list includes several *Compositæ*, all known species except the three here described. The first is a *Spilanthes*; of this, as it was not determinable from the clavis given by Mr. Albert Hanford Moore, of Washington, in his monograph of the genus (Proc. Am. Acad. Arts & Sci. xlii. 521, 569 (1907)), a specimen was sent to that gentleman with a request, kindly complied with, to furnish a description, if its supposed novelty should indeed prove a fact. For the others I am responsible.—S. M.

Spilanthes iolepis A. H. Moore, sp. nov. Caule erecto minute pubescente foliis ovatis ca. 2–3 cm. longis 1–1·5 cm. latis pilis albis instructis dentibus aut serrationibus induratis, apice acuto, basi rotundata vel subacuta, petiolis ca. 0·6–1 cm. longis; capitulis subovoideis aut subcylindricis conspicue irregulariterque violaceo-punctatis, pedunculis 2–6·5 cm. longis; involucri squamis numerosis violaceis pubescentibus; achæniis valde ciliatis.

Hab. Peruvian coast to 7000 ft.

A *S. leucantha* H. B. K. (Nov. Gen. & Sp. Pl. iv. 210, t. 370 (1820)) maxime differt achæniis ciliatis; a *S. ocymifolia* (Lam.) A. H. Moore (*op. cit.* 531) involucri squamis numerosis in locum 6–8, foliis plerumque majoribus; et ab ambabus differt capitulis violaceo-punctatis et involucri squamis violaceis, foliorum dentibus induratis.

The earlier illustrations of *Spilanthes ocymifolia* show a larger number of involucral scales, as characteristic of *S. iolepis* rather than of *S. ocymifolia*[‡]; L'Héritier even gives the number as twelve in the accompanying text. The involucre in the Illustr. Genres has a stiff diagrammatic appearance, and I have observed that crudities in old drawings, especially when these have been sketched from the living plants, which were afterward not available to the author at time of writing, frequently find their way into the text. In other particulars, including especially the size and typical shape of the leaves, both Lamarck's and L'Héritier's descriptions and figures are sufficiently close to the widely distributed plant commonly identified with them. The insistence of both authors on the leaves being entire or subentire is important. The leaves of *S. ocymifolia* are rarely toothed, and then have broad not hardened teeth, while *S. iolepis* has little indurated teeth or serrations.

---

[*] *Climbing Plants*, 2nd ed., pp. 20, 34, and 43 (1875).

[†] *Op. cit.*, pp. 33–36.

[‡] *Bidens ocymifolia* Lam.—Poir. Illustr. Genres, iii. 244, t. 668, f. 3 (1823): *Spilanthus albus* L'Hér. Stirp. Nov. i. 7, t. 4 (1784).

S. leucantha is readily distinguished by the entirely glabrous achenes; *S. ocymifolia* by the small number of involucral bracts (4–8), and leaves which are on the average much larger. *S. iolepis* differs from both in the violet colour of involucre and spots of the disk (note the names "leucantha" and "albus" above), and the indurated toothing of the leaves. It is also more pubescent, the leaves producing characteristic, short, somewhat stiff, greyish or whitish hairs.

Wedelia Forbesii, sp. nov. Caule herbaceo gracili sparsim ramoso hispidulo, foliis parvis subsessilibus lanceolatis obtuse acutis basi obtusis trinervibus margine subevanide denticulatis membranaceis pag. utraque sed præsertim inf. hispidulis, pedunculis solitariis folia longe excedentibus gracillimis ipso sub capitulo incrassatis hispidulis, involucri phyllis ext. late oblongis obtusis ima basi coriaceis aliter herbaceis phyllis int. ext. similibus nisi paullo minoribus omnibus extus hispidulis, ligulis circa 9 bene exsertis, receptaculi paleis late oblongis acutis prope apicem denticulatis dorso prominenter carinatis apice puberulis tenuibus decoloribus costa nigra percursis, achæniis oblongo-linearibus appresse setosis, pappo cyathiformi ore breviter ciliolato-lacerato adjecta arista satis rigida duplo longiore.

Hab. Valley between Pacasmayo and Rail-head, 7000 ft.

Folia 3–4·5 cm. long., 1–1·5 cm. lat., minute glanduloso-punctata; petioli 2 mm. long., hispiduli. Pedunculi 8–16 cm. long. Capitula pansa 1 cm. long., 2 cm. diam. Involucri phylla ext. 8 × 3 mm. Receptaculi paleæ 6–6·5 mm. long. Ligulæ ovatæ, apice bidentatæ, binervosæ, 8 × 5 mm. Achænia adhuc maxime cruda 2·5 × ·75 mm.; radii compressa, 1 mm. lat. Pappus ·4 mm. long.

The small, almost entire leaves and long peduncles, together with the pappus, are the chief feature of the species.

Trixis (§ Aplochlænæ) **hexantha**, sp. nov. Ramis fruticosis sat tenuibus sursum foliosis pubescentibus dein glabrescentibus, foliis parvis petiolatis oblongis vel oblongo-lanceolatis obtusis vel obtuse acutis basin versus gradatim extenuatis firme membranaceis supra puberulis subtus pubescentibus, capitulis æqualifloris 6-flosculosis pro rata mediocribus in paniculas breves corymbosas oligocephalas ordinatis, involucri campanulati phyllis 5 uniseriatis lineari-oblongis obtusissimis nisi obtusis pubescentibus apice barbellatis adjectis bracteis paucis (solemniter 3–4) linearibus obtusis pubescentibus phylla subæquantibus, receptaculi alveolis ore pubescentibus, corollis flavis ex involucro plane eminentibus horum labio exteriori ovato-oblongo 3-denticulato interiori alte bipartito, achæniis linearibus basi leviter angustatis apice breviter contractis papillosis, pappi setis copiosis 2-seriatis scabriusculis dilute stramineis.

Hab. Valley between Pacasmayo and Rail-head, 7000 ft.

Folia exempl. unici nobis obvii summum 3 × 1 cm., pleraque equidem circa 20 × 5 mm., in sicco griseo-viridia; costa media supra plana, subtus maxime prominens; petioli 4–5 mm. long. Paniculæ 2·5 × 2·5 cm. Pedunculi proprii sæpius 2–4 mm. long., pubescentes. Bracteæ 6–7 mm. long. Involucri phylla 7·5 mm. long., 1·5 mm. lat., coriacea, margine membranacea, dilute griseo-brunnea. Corollarum tubus anguste infundibularis, 7 mm. long.; labium exterius 4–4·5 × 2 mm.; labium interius 3·5 × ·4 mm. Achænia 5–6 mm., pappus 8 mm. long.

Distinguishable at once from *T. paradoxa* DC. by means of the small, narrow leaves and the short involucres.

THE ROGUE WALLFLOWER.

By F. J. Chittenden, F.L.S.

[Reprinted by permission from the *Journal of the Royal Horticultural Society*, xl. 83–87 (August, 1914). In addition to the papers cited, reference may be made to a note in this Journal for 1882 (p. 282) by Robert Holland, and to a paper by Duchartre —"sur une monstruosité de la fleur du violier (*Cheiranthus Cheiri*)" in Ann. Sci. Nat. (Bot.) sér. 5, xiii. 315–339, t. 1.—Ed. Journ. Bot.]

From time to time there appears among wallflowers a rogue form apparently without petals and looking at a cursory glance as though the flowers had failed to open. This rogue form is not confined to any one variety, but occurs in both yellows and reds.

The form has been known for a long time and has even received a botanical name, for A. P. de Candolle[*] describes it under the name *Cheiranthus Cheiri γ gynantherus*, with the following diagnosis: "Antheris nempè in carpellâ mutatis." It appears to arise suddenly from time to time, but, as the observations to be described below show, it may possibly be that certain apparently normal individuals among wallflowers are so constituted that their seed necessarily produces both normal and rogue form. That is, they may be hybrids in the Mendelian sense and, so to speak, carry the characters of both normal and rogue forms. On the other hand, we have no evidence to show that the rogues do not arise suddenly as seminal sports.

The malformation existing in the rogues is a very peculiar one, in which both petals and stamens are involved. The petals are reduced to oblong coloured pieces about the length of the sepals or a little shorter. A remark in Masters' *Vegetable Teratology* [*] seems to infer that at times the petals may be developed normally. He says, "In most of the flowers of this variety the petals are smaller and less perfectly developed than usual." Brongniart [†] makes a similar remark: "Dans ces *Cheiranthus* monstrueux, qui étaient très nombreux dans les parterres du Muséum en 1841, les sépales et les pétales existent dans leur position habituelle, mais en général les pétales ne prennent qu'un développement imparfait, ce qui signale immédiatement les plantes qui sont le siège de cette monstruosité." We have not, however, met with any cases in which normal petals were developed. It is almost to be expected that such cases would occur, for it is scarcely credible that a single character-determinant should produce the remarkable and dissimilar abnormalities which occur in both petals and stamens.

---

[*] DC. *Prodromus*, I. p. 135 (1824).

The most extraordinary change, however, is in the stamens which are converted into carpels. As Allman [‡] has pointed out, there is considerable variation in the number of the supplementary carpels and in their adhesion. The full number is six, derived from the six stamens, but those corresponding with the two lateral stamens are not infrequently smaller than the others, or altogether absent. Allman found the ovary with the short style of these supplementary carpels was derived from the filament of the stamen, while "the stigma was plainly a transformed anther."

Brongniart [§] has well described the various forms of this rogue met with, all of which we have seen in our own cultivations (see figure). We cannot do better than quote Dr. Masters' translation of his notes.[‖] "Sometimes these six carpellary leaves are perfectly free, and in this case they spread open, presenting two rows of ovules along their inner edges, or these edges may be soldered together, forming a kind of follicle like that of the Columbine; at other times, these staminal pistils are fused into two lateral bundles of three in each bundle, or into a single cylinder which encircles the true pistil. In a third set of cases these outer carpels are only four in number, two lateral and two antero-posterior, all fused in such a manner as to form around the normal pistil a prism-shaped sheath, with four sides presenting four parietal placentæ, corresponding to the lines of junction of the staminal carpels."

The conversion of stamens into carpels is a comparatively rare phenomenon, though conversion of stamens into petals is frequent. It occurs in *Papaver somniferum*, and we have seen it in *P. orientale* in our own garden, but in these cases only some of the stamens are transformed; it has also occurred in *Polemonium*

---

[*] Masters, M. T., *Vegetable Teratology*, p. 305 (1869).

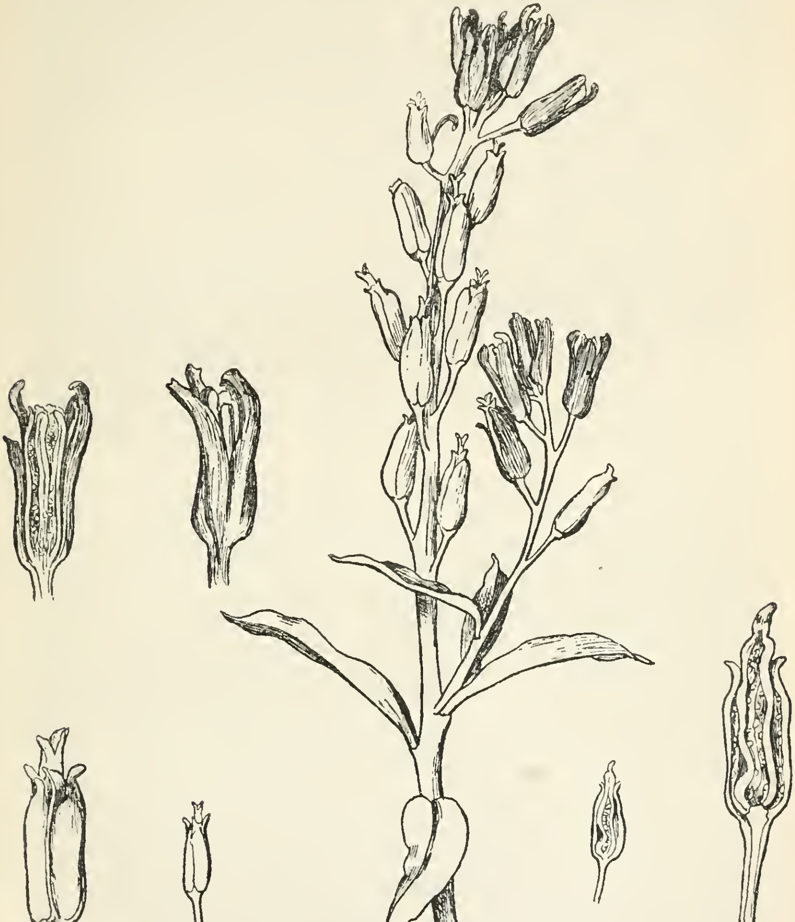
[†] Brongniart, A., "Sur quelques cas de transformation des étamines en carpelles." *Bull. de la Soc. Botanique de France*, t. 8, p. 453 (1861).

[‡] Allman, Prof. G. J., "On the Morphology of the Fruit in the Cruciferæ, as illustrated by a monstrosity in the Wallflower." *Report Brit. Association*, July, 1851 (*Ipswich*) *Trans.*, p. 70 (1852).

[§] Brongniart, A., *l.c. ante*.

[‖] Masters, M. T., *l.c. ante*.

cœruleum. Masters[*] quotes Goeppert as saying that the peculiarity in *P. somniferum* was reproduced by seed for two years in succession, but whether the seed was produced by the central or the supplementary carpels he does not say, while Brongniart[†] obtained fertile seed of *P. cœruleum* from both central and supplementary carpels. He does not record the result of sowing this seed, however.



The "Rogue" Wallflower, with details of variation in the Flower Structure.

No one seems to have tried to obtain seed from the lateral carpels of the rogue wallflower until Professor G. Henslow, in 1910 or 1911, pollinated flowers of a rogue which occurred in his garden at Leamington.* Some of the flowers he pollinated from a red, others from a yellow variety. Both central and supplementary carpels set seed, the former much more than the latter. This seed was sown at Wisley and grown on to flower, the plants produced being all alike, except in colour, and all normal. None showed variation in number or form of petals, stamens, or carpels, but both red and yellow flowers were produced, some of the former with streaks of yellow. The normal type was thus clearly completely dominant to the rogue. We do not know to which colour type the original rogue belonged.

---

[*] Masters, M. T., *l.c. ante*.

[†] *l.c. ante*.

Seed was saved from these plants interpollinated and sown as soon as ripe. Some of the resulting plants flowered in 1913 and showed that the seed had given rise to two types, the normal and the rogue, but as many had not arrived at flowering size they were all grown on to flower in 1914. A few plants died from one cause or another, but 143 flowered, and of these 101 were of the normal type (both red and yellow) and 42 of the rogue type (both red and yellow). On the assumption that we have to deal with a simple 3 to 1 Mendelian segregation, the expectation would be 107 normals and 36 rogues, and the numbers obtained are sufficiently near to the expectation to suggest that simple segregation is taking place.

The case is a particularly interesting one, for the differences between the two forms are marked and complex, and the fact that the dominance is complete is in itself very interesting. As we have said, the change from maleness to femaleness is a rare one, but the results of the experiment seem to show that in *Cheiranthus* femaleness is recessive to maleness.

The persistence of this rogue type in small numbers, even though now great care be exercised in eliminating them from plants growing for seed, may be readily understood, if we assume the rogue on its first occurrence produced seed.† The seeds produced by it must have been hybrids, since the rogue itself produces no pollen, but they would doubtless have been sown among others from perfectly normal plants, and the culture would consist of many true normals, and a few hybrids, apparently normal, and quite indistinguishable from the normals in structure. The normals would far outnumber the hybrids, and the chances of interpollination among the latter would be correspondingly small, with the result that, while hybrids would be produced with each succeeding generation, rogues—the pure recessives—would rarely appear.

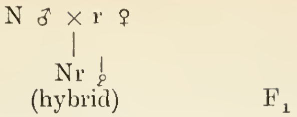
We may show this graphically by the following diagrams, where N stands for the dominant normal, r for the recessive rogue.

Crossing the rogue with the normal (which can be done only one way) we have:

---

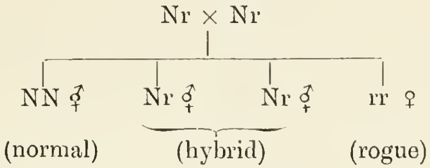
[*] Journal R.H.S. xxxviii. p. xxxix. (1912).

[†] Rogues allowed to grow among plants produce a few seeds without artificial pollination.



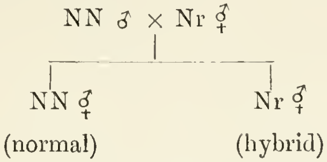
Seed may be produced by the Nr plants either by intercrossing among themselves or by crossing from the normals, and the results will be different in these two cases:

1. Where the hybrids intercross:



and rogues will reappear in the proportion of one to three, two of which are hybrids.

2. Where the hybrids cross with the normal (the most likely thing to happen):



normals and hybrids being produced in equal proportions. Besides these there are numerous normals breeding true, so that the *proportion* of hybrids to normals will diminish in succeeding generations. They could be eliminated by breeding from individuals, but as this is not done the hybrid type persists and there is always the possibility (although a remote one) of a rogue being thrown off, even without the possible occasional variation that is usually supposed to account for the production of these monstrous forms, and quite apart from the physical environment of the plants grown for seed.

AZOLLA CAROLINIANA Willd.

By W. H. Burrell, F.L.S.

There is good evidence to show that *Azolla filiculoides* Lam. has established itself in the Thames Valley and elsewhere, but it is desirable that botanists should understand the obscure status of *A. caroliniana* Willd. in the list of British plants. The value of the only vegetative character by which it was supposed the two species could be distinguished when barren has been questioned—"The character of the hairs of the leaves does not seem to be decisive" (Bot. Ex. Club Rep. for 1913, p. 346) and we have now the statement that no fruiting material has been found in the British Isles (Marsh, Journ. Bot. 1914, p. 212). There seems to be no valid reason why the British and Irish plants should not be reduced to one species, *A. filiculoides*.

The problem arose in 1912 when Ostenfeld diagnosed the Norfolk plant, and his opinion had to be harmonized with the generally accepted belief, based on high authority, that the plant at Woodbastwick was *A. caroliniana*. The easy and natural solution of the difficulty was to assume that two species were present, which seemed not improbable, because the material grouped itself into two well-defined types: one distinguished by its pale green leaves with hyaline border, standing at a wide angle with the stem, the fronds riding high and very buoyantly on the water; the other having its dull olive-green leaves edged with red, closely imbricated, the fronds being smaller and more closely appressed to the water. An attempt to make the smaller plant *A. caroliniana* failed; it was always barren, and, after a prolonged study, the opinion was formed that it was an immature state which eventually passed to the adult fruiting state of *A. filiculoides*, the altered angle of the leaf-lobes and the increased buoyancy of the fronds being due to inflation of air cavities in the basal tissues. Direct evidence is not available to show (*a*) that these small immature plants develop the fruit of *A. filiculoides* in due course; (*b*) at what stage in development the marked inflation of the air cavities takes place. In culture tanks the plant deteriorates, and observation of isolated fronds *in statu naturæ* has failed, owing to fluctuation of water-level at Woodbastwick from tidal causes. No attempt has been made to grow it on uninfected waters, for sentimental reasons. While it is desirable that these two details should be cleared up, it may be stated in support of the relationship of the two forms that (*a*) they usually occur together in Norfolk, and have been received mixed from other stations. A vast quantity of the immature state was noted in Ranworth and Walsham Broads in October, 1913. The distribution of *Azolla* in the Bure Valley by flood took place in August, 1912, just at the period when fruit was approaching maturity. Reproduction by spores was to be expected, and would account for the large proportion of immature material present at the later date. (*b*) The smaller plant has repeatedly been diagnosed as *A. caroliniana*, but whenever fruit has subsequently been produced, it has proved to be that of *A. filiculoides*, and there seems to be no clear reason for assuming that two species are involved.

In considering possible causes for the existing confusion, Campbell's history of the plant in America seemed to offer a useful clue:—"*A. filiculoides* is confined to the western part of America, being reported from Chile to California at least and probably beyond. Until very recently American botanists confounded this species with *A. caroliniana* of Eastern America, and in the *Botany of California* only that species is mentioned. I have examined material from various parts of California, and in all cases the plants were undoubted specimens of *A. filiculoides*" (Ann. Bot. vii. 155).

The introduction of material incorrectly named, and its distribution by nurserymen and others, might account for the spread of an error which originated in America, but in view of the clear summary of diagnostic characters by Strasburger in his monograph, accessible in the more important botanical libraries, the persistence of the error is difficult to explain.

A NEW HYBRID OPHRYS.

By Colonel M. J. Godfery.

Ophrys olbiensis Godfery, hybr. nov. *O. arachnitiformis* Gren. & Phil. × *O. Bertolonii* Moretti. Tuber . . . . foliis inferioribus . . . . . folio summo caulem vaginante acuto, spica laxa floribus pluribus distantibus, bracteis ovarium multo excedentibus acutis, sepalis lineari-oblongis obtusis reflexis, petalis sepala semiæquantibus glabris, labello sepalis breviore ovato trilobo emarginato apice appendice parvula basique mammillis 2 prominentibus externe dense velutinis instructo saturate purpureo-brunneo maculo scutiformi utrinque emarginato notato.

Tubers not seen, doubtless ovoid or sub-globose like those of the parents. Lower leaves not seen. Upper leaf sheathing acute. Stem erect (20 cm.). Spike lax, with several distant flowers (eight in the specimen found). Bracts sheathing much longer than ovary, acute, green. Outer divisions of perianth linear oblong obtuse, reflexed, longer than labellum, pink with green median nerve. Inner divisions half as long as the outer ones, non-ciliate, brownish pink, border undulate, brownish. Labellum trilobed, rather small, ovate with two prominent mammæ at base (which are densely furry on the outer side), dark purplish brown, with a glabrous iridescent shield-shaped spot emarginate both above and below, a little nearer the apex than the base. Apex of labellum emarginate, with a rudimentary appendix.

This hybrid has the habit of *O. arachnitiformis*. The unusually long outer segments of the perianth, and their marked reflexion, are very striking. The labellum is like that of *arachnitiformis*, with the shield of *Bertolonii*, but no other markings. Found at Hyères, April 5th, 1914.

WATSON EXCHANGE CLUB REPORT, 1912–1913.

From the note of the Distributor for the year, Mr. W. Barclay, which stands first in this Report, it is gratifying to learn that both in quantity and in quality the specimens sent in have been above the average. We note, too, with interest the energy displayed by those whose names are comparatively recent additions to our workers: Mr. W. C. Barton, for example, has sent in nearly 700 sheets, "the largest number that has ever been contributed at one time by any member." The Club is fortunate in having as its referees those who have long since taken rank among the leaders in British botany—the Revs. E. F. Linton, E. S. Marshall, W. Moyle Rogers, and Mr. C. E. Salmon; and it is satisfactory to note that the Report is confined to matters which definitely come within its scope, with a commendable absence, save in one or two cases, of "casuals."

Intended, as it is, primarily for members of the Club, and confined to notes upon specimens sent by or to them, the Report does not lend itself largely to citation, and it seems to us that its domestic character is more marked than it has been in other years. We cannot but feel, also, that in some cases the conflicting opinions of recognized authorities are calculated to puzzle rather than to help the worker. Take for example the plant named by the collector *Glyceria distans* Wahl. var. *pulvinata* Fries. Mr. Bennett accepts this identification; Mr. Marshall says it "cannot be this variety"; Prof. Hackel agrees, and suggests *Atropis convoluta*, but "hesitates to give a definite opinion"; Dr. Stapf "has no doubt it is *Atropis maritima*"; Dr. Rendle has examined it and "would suggest that it is neither *convoluta* nor *maritima*," and adds that "Dr. Lang should send more satisfactory specimens." In this case there is no question of a mixture of specimens, as the editor, Mr. Goode, tells us that the notes, with the exception of Mr. Marshall's, "have been sent after an examination of the same specimens." Again, of a plant entered under *Spergularia salina* var. *neglecta*, it is suggested that "the gathering was a mixed one," would it not then have been better to suppress the contradictory notes? Here is another example of the same kind:

"*Hieracium maculatum* Sm. Lindfield, E. Sussex, May 29, 1912.—R. S. Standen. I have not seen Smith's type of *H. maculatum*; but my collection contains at least two plants under that name which can hardly be conspecific. The Rev. Augustin Ley was surely right in referring this Lindfield hawkweed to *H. Sommerfeltii* Lindeb. var. *splendens* F. J. Hanb. (*H. Griffithii* F. J. Hanb. *prius*); I have again carefully compared them, and find the resemblance, especially to cultivated var. *splendens*, exceedingly close. The only *H.* '*maculatum*' of mine which Mr. Standen's plant approaches is that from old walls at Chichester, which is more pilose-headed than the rest, but far less shaggy-headed than these and other specimens from Lindfield. The occurrence of any *Sommerfeltii*-form, so far south, is a geographical puzzle.—E. S. M. It has long appeared to me that we have two forms placed under this name; one form with longer hairs clothing the involucre and coarser ciliation of the leaves than the other. I am not prepared to say which is Smith's plant. The Lindfield plant seems to agree with specimens from Chichester walls, gathered by the late Rev. F. H. Arnold, and said by him to be from the station where Smith got the original specimens. I have not as yet seen these. It is not *H. Sommerfeltii*, nor var. *splendens* F. J. Hanb.—E. F. L."

For the other notes on Hawkweeds, as for those on such critical genera as *Viola*, *Rubus*, *Rosa*, *Euphrasia*, *Mentha*, and the like, reference must be made to the Report, from which we proceed to make a few extracts.

" *Sisymbrium altissimum* L. (=*S. pannonicum* Jacq.). A few specimens are sent to record the great extension of area now occupied by this species at St. Anne's-on-the-Sea, W. Lancs., v.c. 60, July 15 and 19, 1912. When I first found this plant at St. Anne's, ten years ago, it occurred on both sides of the bridge over the railway in St. Thomas's Road, but it has now spread over the district between Blackpool and Lytham.—CHARLES BAILEY."

" *Viola* '*canina* L.' var. *crassifolia* (Grönv.) × *stagnina*. Woodwalton Fen, v.c. 29, Hunts., June 5, 1912. Named as above by Mrs. Gregory, on the spot. A very beautiful violet, when growing; it showed clear traces of the parents, among which it occurs, and formed large masses of flowering-stems, visible from a considerable distance.—E. S. MARSHALL."

" *Sagina nivalis* Fr. Ben Lawers (at 3000 ft.), Mid Perthsh., v.c. 88, July, 1912. This is not a rare plant on the Breadalbane Range, but it seems to be dying out on Ben Lawers. I do not see it in the Eastern Ravine at all now. In the well-known station on the Western Ravine the plants are only about ½–1 in. in diameter. I do not know any botanist (or collector) who knows the station these are taken from, though some of them are evidently very old plants.—P. EWING."

" *Erodium cicutarium* L'Hérit. var. *glandulosum* Bosch. (1) On sand among bracken, Lihou Island, Guernsey. An extraordinary plant, pointed out to me by Mr. Marquand; straggling over sand under bracken, especially at the mouth of rabbit burrows. The branches were as much as 3 ft. long, with flowers and green foliage only towards the tip.—W. C. BARTON. (2) Sandy Coast, Grand Havre, Guernsey, August 21, 1912. In plenty on the sandy coast, this small-flowered form was growing only in rosettes up to 12 in. diameter. I saw no plants developing long straggling branches as on Lihou Island and on Headon Hill.—W. C. BARTON. This is our usual small form of barren sandy ground (heaths, &c.), which I suppose to come under type (=*α vulgatum* Syme). The species is, as a rule, more or less glandular.—E. S. M."

" *E. moschatum* L'Hérit., var. (Ref. No. 38). Sandy coast, Grand Havre, Guernsey, August 21, 1912. I have not seen an authentic specimen of var. *minor* Rouy & Foucaud, but my No. 38 agrees well with their description, and seems probable from the habitat. I quote from Rouy & Foucaud: 'var. *β minor*, Nob. Plante de 8–12 cm. très réduite dans toutes ses parties; feuilles à segments petits (3-4 fois plus petits que dans le type), ordinairement profondément incisés ou subpinnatifides; pédoncules 2–4 flores, plus courts que la feuille; bec du fruit bien plus grêle, mais de même longueur. Cà et là dans les pelouses maritimes rases.' The variety or form is frequent along the sandy coast from Grand Havre to Lerée. Mr. Marquand told me that, so far as he knew, it had been passed over as a dwarf form of *Erodium cicutarium*, of which also I send specimens (my No. 36). In the British Museum there is a similar plant collected by Mr. Marshall (No. 2924, April 1, 1905, on limestone rocks, Purn Hill, Bleadon), on which he remarks, 'very glandular, not musk scented, stamens (apparently) not bidentate at base.'—W. C. Barton. From the broad stipules and other characters, this seems to be referable to *E. moschatum*, though the two specimens before me are rather far advanced. If so, it is extreme *β minor* Rouy.—E. S. M."

"*Erigeron mucronatus* DC. Old walls, St. Peter Port, Guernsey, August 4, 1912. A Mexican plant, established in Guernsey over forty years.—W. C. Barton."

"*Pyrola rotundifolia* L., form intermediate between type and var. *arenaria*. Grande Mare, Guernsey, August 16, 1912. (See Marquand's *Flora of Guernsey* and Journ. Bot. 1893 [334, 373].) It is unfortunate that the habitat of this plant is being rapidly reduced. Only a very small area of La Grande Mare is still undrained; the large pools have disappeared, and a few years will probably see the extinction of the marsh plants of the locality.—W. C. Barton. The plant received differs from all those in my herbarium by its smaller orbicular foliage and more numerous flowers (twelve, besides what looks like a rudimentary one at the apex); the fruit is also appreciably smaller. Of *P. serotina* Mieg. I have seen neither specimens nor description; Nyman makes *P. rotundifolia* var. *arenaria* Koch a synonym, and gives N.W. France as one of its habitats, which brings it rather near to Guernsey. There is still one blossom with the petals unshed, though it was collected on August 16; by which time typical *rotundifolia* would be long over in the south of England. I fail to see how this Guernsey specimen is intermediate between that and the W. Lancashire var. *maritima*, which tends to be rather dwarf; there are only two bracts (not very large or conspicuous) below the inflorescence.—E. S. M."

"*Anagallis arvensis* L. var. *carnea* (Schrank). Albecq, Guernsey, August 16, 1912. The variety is frequent in Guernsey, especially near the sea, growing with the type. I saw no blue-flowered specimen in the island, and am convinced this is not a hybrid, as suggested by Continental botanists and by Dr. Williams's *Prodromus*, p. 431, but a colour form (see Journ. Bot. 1911, p. 44).—W. C. Barton. Correct; the petals are distinctly glandular-ciliate.—E. S. M."

"× *Symphytum densiflorum* Bucknall (= *S. officinale*, var. *purpureum* × < *S. peregrinum*). Bank of the Land Yeo, near Gatcombe Mill, N. Somerset, v.c. 6, June, 1912 (see Journ. Bot. 1912, p. 334). Specimens passed by Mr. Bucknall.—Jas. W. White."

"× *Symphytum discolor* Bucknall (= *S. officinale*, var. *ochroleucum* × < *S. peregrinum*). By the Land Yeo stream, near Gatcombe Mill, N. Somerset, v.c. 6, June, 1912 (see Journ. Bot. 1912, p. 333). Specimens passed by Mr. Bucknall.—Jas. W. White."

"*S. peregrinum* Ledeb. (*fide* C. Bucknall). By cart track between Manor Farm and King's Hedges Road, Chesterton, Cambs., v.c. 27, June 7, 1912.—G. GOODE. *S. peregrinum* Ledeb., when growing on the banks of streams, is a tall, luxuriant plant, with flowers rose-coloured in bud, then bright blue, the stem without wings, and bearing abundant fruit. When growing in dry localities, the flowers remain rose-coloured or are only partially blue, and the entire plant is not so well developed as when growing in moister situations."

"This species forms a series of hybrids with the white and purple-flowered varieties of *S. officinale*, which have been described by the writer in the *Journal of Botany*, vol. l. p. 332 (1912). These are distinguished by the more or less winged stem, by the colour of the flowers, which are white, rose-coloured, bluish or purple, always changing to a cinereous blue in the dried plant, and by the fruit being sparingly produced.

"Typical *S. peregrinum*, as well as some of its hybrids, has often been named *S. patens* Sibth., but the latter is probably only *S. officinale* var. *purpureum* with undeveloped fruit, and the calyx-lobes, in consequence, spreading after the flowering instead of being connivent over the nutlets, as is the case when they are well developed. *S. peregrinum* has also been confused with *S. asperum* Lepech. (*S. asperrimum* Donn and M.B.), which, in Britain, is a much rarer plant. It is distinguished by the small calyx with obtuse segments, the calyx in *S. peregrinum* being generally considerably larger, with acute lanceolate segments. With regard to the clothing of hairs and prickles, and in other characters, both species are variable, and they are often difficult to separate except by the above-mentioned characters of the calyx; and when, owing to conditions of climate or situation, the flowers are imperfectly developed, even these characters are liable to be deceptive. It is probable that intermediates, and possibly hybrids, occur, and that they are sometimes the cause of the difficulty in the accurate determination of these plants.

"Ledebour, in the *Flora Rossica*, has well distinguished the two species, and complete descriptions, with remarks on the forms which occur both in the wild and naturalised state, will be found in the writer's 'Revision of the Genus *Symphytum*' in the *Journal of the Linnean Society* (Botany) xli. Dec. 1913.—CEDRIC BUCKNALL."

"*Veronica hybrida* L. Riverside rock, under Leigh Woods, Bristol, N. Somerset, v.-c. 6, July 6, 1912. New county record. It is only this past summer that a few plants have become established on the Somerset side of the Avon.—IDA M. ROPER."

"*Chenopodium leptophyllum* Nutt. (*fide* G. C. Druce). Waste heap of London rubbish north of Welwyn Tunnel, Herts., v.-c. 20; Sept., Oct. and Nov. 1912. Habit very different from *C. album*, and possibly a distinct species.—J. E. LITTLE. This is *Chenopodium album* var. *leptophyllum* Moquin in DC. Prodr. xiii. part ii. 71 (1849), naturalised or adventitious in Europe from North America. The name '*C. leptophyllum* Nuttall,' often seen in systematic works, is merely a name cited in synonymy by

Moquin. Citation '*C. album* var. *leptophyllum* Nuttall' is also incorrect. The plant is very closely allied to the European forms of *C. album*, and is no species.—C. E. Moss."

"*Agrostis verticillata* Vill. Roadsides and quarries on diorites or syenites, near Vale Castle, Guernsey, August 14, 1912. Confined, so far as my experience goes, to the quarries of 'granite,' or the edges and drains of roads made with 'granite,' small particles of which are held tenaciously by the roots. I have a few specimens stoloniferous.—W. C. Barton."

SHORT NOTES.

Linaria arenaria DC. in N. Devon.—Whilst botanizing on Braunton Burrows on Monday, August 17th, I found a plant that was quite new to me, and which I subsequently identified as *Linaria arenaria* DC. I thought at the time that I had found a plant that was also new to Britain, but on taking it to the British Museum, I was shown specimens that had been collected at Westward Ho! a few years previously. My attention was also drawn to notes in this Journal for 1907, pp. 411, 451, the first of which speaks of the discovery of the plant at Westward Ho!, and the second states that the seed of the plant had been introduced there from Brittany. The Rev. E. S. Marshall has since informed me that a lady sent him specimens of the plant, which he believes came from the same spot in which I found it, namely, at the Saunton End of Braunton Burrows. The spot where I found the plant was a considerable distance from the sea, from which it is separated by a very wide beach and also plain sand dunes. This is a plant that does not appear to grow on the plain sand dune, but in sandy turf associated with such plants as *Viola Curtisii*. It had the appearance of being native, and there certainly could have been no question of its having been brought to the spot in ballast. Moreover, the seed being small and heavy, they could not have been blown there from Westward Ho! Saunton End is some eight or nine miles from Westward Ho!, and Braunton Burrows extend for some six miles to the west of Saunton End, and are separated from Westward Ho! by the wide estuary of the River Taw. As the plant occurs on the sandy coasts of Normandy and Brittany, there would appear to be no valid reason why it should not be native on the sandy coasts of Devon. It was plentiful in suitable ground, but did not appear to occur at all on the sand dunes which, with the river, intercept it from Westward Ho! The object of this note is not to express an opinion, but to state the facts as I observed them. The history of this plant in Britain exemplifies the folly and mischief of sowing seeds in this country of obscure foreign plants, which might reasonably be expected to be truly native. Of course it is possible that whoever sowed the seed at Westward Ho! also sowed it at Saunton, though this seems scarcely probable. Perhaps Mr. Wainwright, who wrote the note on its being sown at Westward Ho!, can throw some light on the subject.—Frederick J. Hanbury.

Ranunculus ophioglossifolius Vill.—Specimens have lately been received by the Department of Botany of this interesting and almost extinct British species, collected by Mr. Ronald Good in a very wet and marshy meadow near Dorchester. As is well known, it was once a native of St. Peter's Marsh, Jersey; Mr. Arthur Bennett has a specimen dated 1872, but Dr. J. C. Melvill failed to find it in 1876. It was found by Mr. J. Groves in 1882 in a wet ditch west of Hythe, Hampshire; it was recorded for E. Gloucester in 1890 by Mr. F. J. Hanbury (Journ. Bot. 1890, 282), and was found in 1912 near Badgeworth, in that county, by Mr. A. S. Montgomrey, a specimen from whom is in Herb. Mus. Brit., in 1912. The distinguishing characteristics are the very small, pale yellow flowers, the long-petioled, cordiform lower leaves, and the small achenes with a very short style, tubercled on the sides, with a few stiff hairs.—E. G. Baker.

Seligeria paucifolia in North Hants.—On July 30th I met with this rare little moss on detached pieces of chalk in a densely shaded lane near the secluded village of Combe, North Hants, at the foot of the chalk downs near the Berkshire border. This species is well known in Sussex, Surrey, and Kent, but there is only one previous record for Hants (v.-c. 11), and I have no note of the exact locality. It seems to be almost always found on detached fragments of chalk, although the original specimens from Wetherby, Yorkshire, on which Dickson founded the species under the name of *Bryum paucifolium* in the fourth fasciculus of his *Cryptogamia*, occurred on fragments of bricks in rubbish-heaps.—A. Bruce Jackson.

Vaccinium Oxycoccos in Somerset.—I have received fresh specimens of this plant and of *Empetrum nigrum* from Miss Helen Saunders, of South Molton: they were gathered last month on Exmoor, a few yards from the Devon boundary. The former is new to Somerset, the latter very rare in the county.—James Britten.

A Correction.—In the article on "Alpine Vegetation on Ben-y-Gloe" (pp. 227–235) the quotations from *Types of British Vegetation* were erroneously attributed to Dr. C. E. Moss. Therefore on pages 228, 229, 233 and 235 for "Moss" read Smith; chapter 13 (pp. 288–329) in the work quoted, on Arctic-Alpine Vegetation, is by Dr. W. G. Smith.

REVIEWS.

Matériaux pour la Flore Crytogamique Suisse. Vol. iv. fasc. 2. Monographies d'Algues en Culture Pure. Par R. Chodat. Berne, 1913.

This volume, as indicated by its title, contains an extended account of such Green Algæ (mostly of the Protococcales) as Professor Chodat has been able to obtain in pure cultures. After a preliminary statement on the value of specific characters, the author gives a lengthy account of cultures in the genera *Scenedesmus*, *Chlorella*, *Palmellococcus*, and a few others. Chodat's present ideas of specific distinctions are somewhat quaint, and are in striking contrast to those which he expressed in 1902. In his account of cultural experiments in the genus *Scenedesmus*, he describes numerous new "species," which appear to be based upon physiological rather than morphological characters and would more correctly be regarded as biologic forms. His inclusion of *Tetradesmus wisconsinensis* Smith within the genus *Scenedesmus* is inconsistent with the separation advocated for other genera, and Smith's careful cultural work indicates that *Tetradesmus* possesses a morphological character of such importance as to warrant its generic rank.

Coccomyxa subellipsoidea Acton is stated to be a species of *Chlamydomonas*, notwithstanding the fact that this Alga has no motile state except in special cultures, and that it lives exclusively on damp rocks and stones, having entered into the thallus of that most primitive of all Lichens, *Botrydina vulgaris*.

Chodat still attaches great importance to the presence or absence of pyrenoids in the chloroplasts of the lower Green Algæ, although there is abundant evidence that pyrenoids may appear *de novo* in many algal chloroplasts and disappear in others. It is upon the sole basis of the presence of a pyrenoid that he upholds the distinction between *Hormidium* and *Stichococcus*, and between *Chlorella* and *Palmellococcus*. The incongruity of this may be realized when it is remembered that in some species of *Ulothrix*, such as *U. æqualis* and *U. subtilis*, pyrenoids are habitually absent. Moreover, Chodat has himself described species of the genus *Ankistrodesmus* (=*Rhaphidium*) both with and without pyrenoids, at the same time recognizing that they belong only to one genus.

A new genus, *Monodus*, is described, which appears to be very closely allied to *Chlorella*; and a second one, *Coccobotrys*, is established for the algal cells obtained in cultures from certain species of *Verrucaria*. *Coccobotrys* is placed alongside *Botryococcus* and relegated to the Phæophyceæ! In the Lichens *Solorina crocea* and *S. saccata* he finds a *Coccomyxa*—*C. Solorinæ*.

Chodat again puts forward, with certain slight alterations, the same system of classification as that in his work *Etude critique et expérimentale sur le polymorphisme des Algues* (Genève, 1909). This system was reviewed in this Journal for 1910, p. 294, and the criticisms then made require no further modification.

The work is illustrated by two hundred and one text-figures and by nine coloured plates of cultures on solid media.

G. S. West.

Catalogue of the Mesozoic Plants in the British Museum (Nat. Hist.). The Cretaceous Flora. Part I. By M. C. Stopes. Pp. 281+xxiii. Plates I. and II. Trustees of British Museum. Price 12*s*.

The plant remains of the Cretaceous period possess special interest, owing to the fact that during this epoch the Angiosperms became for the first time an important constituent in the vegetation of the earth. Although the Angiospermic remains from pre-

Cretaceous times are very scanty and not yet properly investigated, we find that some of the Cretaceous beds, especially in Portugal, North America, Greenland and Moravia, are full of dicotyledonous leaf-impressions, many of them resembling leaves of modern genera. It is thus of the greatest importance that the Cretaceous flora should be critically examined and catalogued. The British Museum, too, possesses at South Kensington vast stores of beautiful fossil plants of Cretaceous and Tertiary Ages, which have never been properly studied and described, and it is very satisfactory that a commencement of this work has been made. The difficulties of the task are appalling, and the author of the present work found that no progress could be made until a list of the material had been compiled. This list occupies a large part of the volume. The references to papers on Cretaceous plants published before 1910 occupy forty-seven pages, and the list of species described extends to another hundred and eighty-seven closely printed pages.

The more descriptive part of the book deals with the Algæ and Fungi. The families Codiaceæ, Dasyscladaceæ and Corallinaceæ are represented by forms which were fairly well preserved by their calcareous incrustation, and show clearly their vegetative structure, though naturally their reproductive organs are scarcely ever preserved. The genus *Lithothamnium* appears to be represented by a number of species whose external form and internal structure certainly resemble that of the recent genus, though the absence of reproductive structures renders the use of this generic name a little speculative. The much-discussed forms called *Chondrites* are doubtfully placed in the order Phæophyceæ. Much controversy has arisen as to whether the impressions of this type are really to be regarded as plant remains or merely as artifacts mechanically produced. The author has come to the conclusion "that the genus '*Chondrites*' does contain 'species' which are truly the remains of Algæ, though many of those described for the genus are probably of purely physical phenomena," and that in any case it is useful to retain this genus for the present.

The Cretaceous fungi are not of special interest, because their remains are so scanty, though petrified wood, &c., sometimes contains well-preserved examples of parasitic forms. The form called *Pleosporites Shirainus* seems to be a well-marked Pyrenomycete infecting the leaves of *Cryptomeriopsis*, and some other imperfectly known forms are placed among the Pyrenomycetes. Some leaf impressions have the appearance of infection with a fungus of the *Rhytisma* type, but a great deal of uncertainty attaches to these specimens. One or two forms infecting wood have been referred to the Basidiomycetes, but their identification with this group is somewhat speculative. We shall await the appearance of the second volume of this work with much interest, hoping that the author will make clear how much reliance we are to place on the identification of Cretaceous dicotyledons with modern genera.

H. H. T.

BOOK-NOTES, NEWS, &c.

In July, 1889, we gave in these pages (Journ. Bot. 1889, 193–198) some account of H. G. Reichenbach, whose death had occurred on the preceding 6th of May, in the course of which we quoted from his will the passage in which, while bequeathing his herbarium and library to the Imperial Hof Museum at Vienna, he added the condition that it should not be consulted until twenty-five years after his death. That period has now elapsed, and on 16th of last May the sealed cases which contained the specimens were opened under official inspection. A note by Dr. Zahlbrückner, Keeper of the Museum, published in the *Orchid Review* for July, states that the contents were found in excellent condition, and that the specimens will probably be available for consultation by the end of the year.

The *Kew Bulletin* (no. 6) announces the retirement from the Kew Herbarium of Mr. N. E. Brown, after forty years' service, he having reached the age limit. Mr. W. B. Hemsley pays a well-earned tribute to the value of Mr. Brown's work, both published and in the Herbarium, which "contains lasting and invaluable evidence of his industry with pen and pencil."

In view of what was reported (p. 24) respecting the herbarium of the late Dr. H. Franklin Parsons, it may be well to put on record that the whole of his natural history collection (including the herbarium) will be accessible to the public at the Grangewood Museum, Croydon. The collections contain valuable fossils, and a good local herbarium of flowering plants, ferns, mosses, liverworts, lichens, and fungi.

The recent issue (parts x–xii) of *The Essex Naturalist*, published in August, contains papers on the "Coast-Flora of the Clacton District," by Mr. F. Saxer, and on "Autumn Botany at Clacton," by Mr. C. E. Britton; Miss Lister enumerates the Mycetozoa found during the Cryptogamic forays in Epping Forest; and Mr. S. H. Warren gives a list of seeds found during the opening of the Romano-British barrow on Mersea Island.

The part of vol. xxxv. of the *Proceedings of the Dorset Natural History Society* lately issued contains the first portion of "A Tentative Account of the Fungi of East Dorset" by the Rev. E. F. Linton. The fungi of Dorset have hitherto been almost entirely neglected, so that this is a valuable contribution to our knowledge of the botany of the county. The present instalment extends to forty pages; the completing portion will appear in next year's volume of the *Proceedings*.

The most recent (July) part of the botanical Transactions of the Linnean Society contains "An Anatomical Study of the Palæozoic Cone-genus *Lepidostrobus*," with seven plates, by Dr. Agnes Arber.

ALCHEMILLA ACUTIDENS Buser,

AND OTHER FORMS OF ALCHEMILLA VULGARIS L.

By C. E. Salmon, F.L.S.

In order to give a connected account of the history of *Alchemilla acutidens* in Britain it is necessary to recapitulate the following details.

In August, 1911, on the occasion of the first International Phytogeographical Excursion, Dr. Ostenfeld noted the presence of this species on Ben Lawers, Perthshire, and the discovery was reported by Mr. Druce (*New Phytologist*, x. 312; Bot. Exch. Club Report for 1911, p. 18; Journ. Bot. 1912, p. 201).

In this Journal for 1913 (p. 141) I reported that Dr. Lindberg had seen one of the specimens collected by Dr. Ostenfeld on Ben Lawers, and pronounced it an autumnal state of *A. alpestris*, and not *acutidens*.

In 1913 I had the opportunity, when staying with the Rev. E. S. Marshall at Fortingal, of gathering and examining a good series of all the Ben Lawers forms. Roots were brought back for growing on in the garden, as it seemed evident that a plant growing in several places on the Breadalbanes (not only on Ben Lawers) could not be satisfactorily placed under *A. alpestris*.

After careful examination and comparison with numerous examples from the Continent, I felt sure that our plant from Scotland should come under *A. acutidens* (possibly as a variety), and that the original determination of Dr. Ostenfeld was therefore correct.

I again troubled Dr. Lindberg with a set of specimens from Scotland and elsewhere, and included the example collected by Dr. Ostenfeld mentioned above, pointing out that my specimens, identical with his in every way, could not (collected in early July) be called "autumn states" of *A. alpestris*, and the points wherein it differed from that species.

Whilst it was satisfactory to receive all the examples back labelled *A. acutidens*, it was puzzling to have this change of view without any explanation from Dr. Lindberg as to its cause, and this I have been unable to obtain. I can only conjecture that the reason was the absence from the British examples of a character emphasized by Dr. Lindberg (Nord. Alchemilla vulgarisformen, 1909, p. 42) as distinctive of *A. acutidens*—"folia subtus nervis per totam longitudinem ± pilosis." Taking this into consideration and bearing in mind other distinctions, I have come to the conclusion that our plant from Scotland might well be distinguished as a variety of *acutidens* with the name *alpestriformis*, as it certainly shows some affinities with *A. alpestris*. Indeed, in Dr. Lindberg's original decision he said "the hairiness and teeth point to *alpestris*," and Dr. Ostenfeld wrote recently: "I am glad to hear that the Ben Lawers plant was *A. acutidens* . . . but I think you are right in pointing out that it is more glabrous than the Central European form; it comes near to the Faroese and Icelandic one."

In the original description of *A. acutidens* Buser in Bull. Herb. Boiss. ii. p. 104, 1894, a long and detailed account is given from which I translate the following points of distinction from allied forms:—

"Plant medium sized, rather slender and graceful, *not tall, with stems decumbent*, rather yellowish green. Leaves *strongly undulate*, lobes of lower leaves very rounded with a cut between them equal to 2–3 of the teeth (recalling the lower leaves of *incisa*), those of the upper leaves parabolic-triangular, acute, toothed all round. Teeth numerous, 6–9 on each side, very equal, small or medium size, *narrow and close, tapering acute, penicillate, connivent, very silky and ciliate.* Leaves *subconcolorous, clear shining green* above, *pale below, becoming yellow with age and by desiccation*, glabrous, or the upper ones radiated with silky lines in the folds above, and silky along the veins and hairy upon the lobe next the petiole below. Petioles slender, *hairy, often faintly so*, with long stiff *laxly applied hairs* or a portion of the petioles glabrous. Stems rather numerous (2–5), spread-out in the grass, slender, *hairy at the base* (internodes 1–2) *with long stiff, appressed or laxly-set hairs, glabrous for the remainder.* Stem leaves (lower) cut as far as a third with lobes semi-obovate and with connivent toothing; the upper cut as far as a half, with lobes separated and with porrect toothing. Lower pedicels long and divergent, upper quickly diminishing and closer. Flowers *rather large*, dark yellowish green, glabrous. Urceoles when young broad-obconic, a little shorter than the sepals, when mature turbinate or turbinate-ovoid, equalling the sepals. Calyx and calicule relatively well developed, recalling *glabra*. Sepals triangular-ovate, acute, obliquely erect after flowering and usually concealing the moderately exserted styles; calicule segments half as broad and nearly as long ($\frac{2}{3}$–1) as the sepals, lanceolate, very acute. Pedicels equalling or twice as long as the urceoles.

"Leaves 2,5–10,5 × 1,8–9 cm. Stems 10–39 cm. Petioles 2–20 cm. Flowers 3–3,5 mm. long, 3,5–4 broad. Urceoles 1–1,5 mm. Sepals 1,3–1,5 mm. Pedicels 2,5–1."

A description is then given of "two allied races" of *A. acutidens*, named *A. cuspidens* and *A. flavescens* respectively. These will be alluded to later.

I may confess at this point that I have been unable to separate satisfactorily all Buser's species and varieties, even with the help of the careful descriptions he has given and with authentic dried specimens. Others seem to have had the same difficulty—Briquet in Burnat, Fl. Alpes-Marit. iii. 149 (1899) calls the plant under discussion *A. vulgaris* L. var. γ *acutidens*, and remarks that *A. cuspidens* Buser and *A. flavescens* Bus. are, in his opinion, mere variations of this variety. Rouy and Camus (Fl. France, vi. 451, 1900) go further; they combine *A. acutidens* and *A. cuspidens* under *A. connivens* Buser (in Bull. Herb. Boiss. 1894, 107) as a subspecies of *A. vulgaris* L. Finally, H. Lindberg (Nord.

Alchemilla vulgaris-formen, 111, 1909) groups under one species which he calls "*A. acutidens* Buser, Lindb. fil. ampl." the following plants of Buser—*A. connivens β Wichurae* (Bull. Herb. Boiss. 1894, 110), *A. acutidens* subsp. *oxyodonta* and *A. Murbeckiana* (*Botaniska Notiser*, pp. 141–142, 1906).

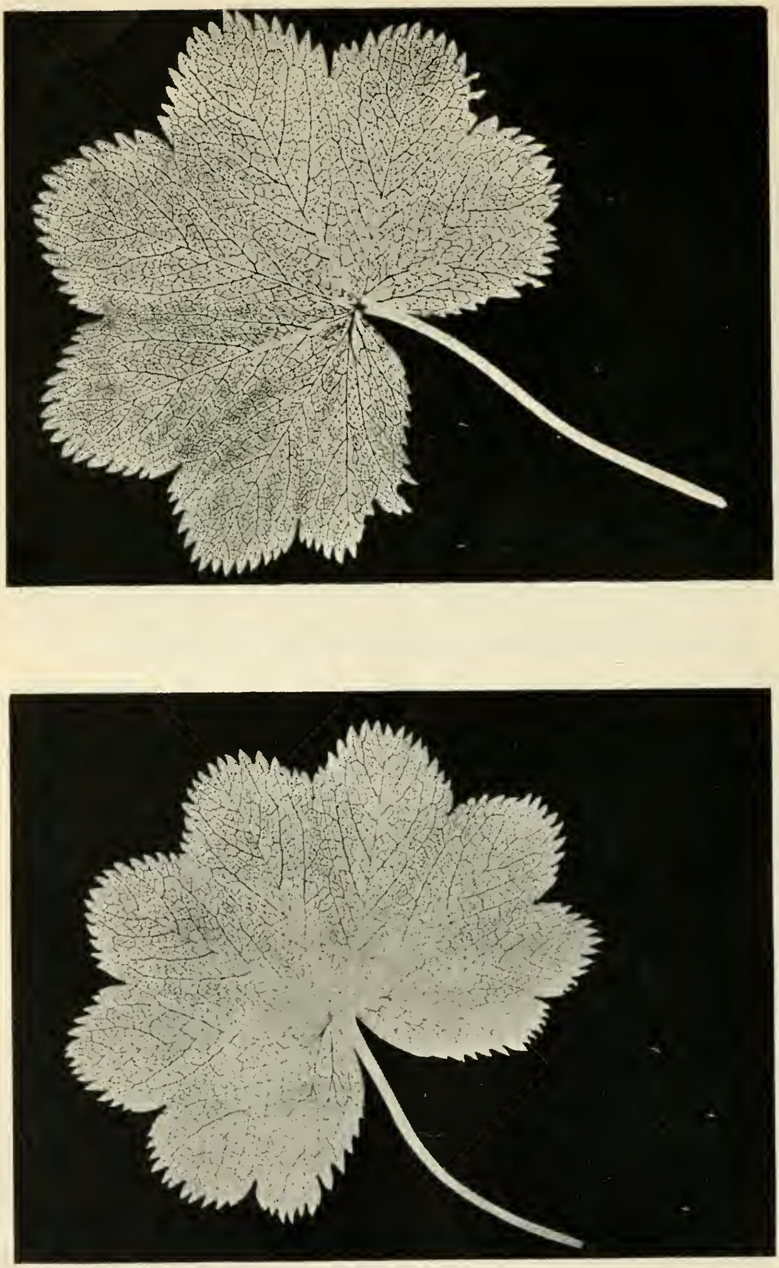
As regards *cuspidens* and *flavescens*, Briquet is perhaps correct in considering the former scarcely separable from *A. acutidens*; it is described as having leaf-lobes with divisions less deep but more marked and more separate (recalling *incisa*), and its flowers larger (recalling *firma*) than those of *acutidens*. Buser's *flavescens* may, perhaps, be a distinct form found in Siberia; it is entirely of a dark yellow (when dry), with more abundant hairiness; the petioles silky, also the base of stem, which is hairy nearly to the top; the leaves are hairy either all over or in the folds, and the toothing smaller but less acute.

Ascherson & Graebner (Syn. Mitteleur. Fl. vi. 411, 1902) divide "*A. eu-alpestris*" into the following six varieties—I. *sinuata* (Buser); II. *acutidens* (Buser) (with a form b. *flavescens* Bus.); III. *montana* (Schmidt) (= *A. connivens* Bus.) with a sub-variety b. *Wichurae* (= *A. connivens β Wichurae* Buser), IV. *versipila* (Buser); V. *typica* (= *A. alpestris* Schmidt) with a b. *latiloba* (*A. alpestris* f. *latiloba* Buser); VI. *frigens* (Buser) (= *A. frigida* Buser non Wedd.).

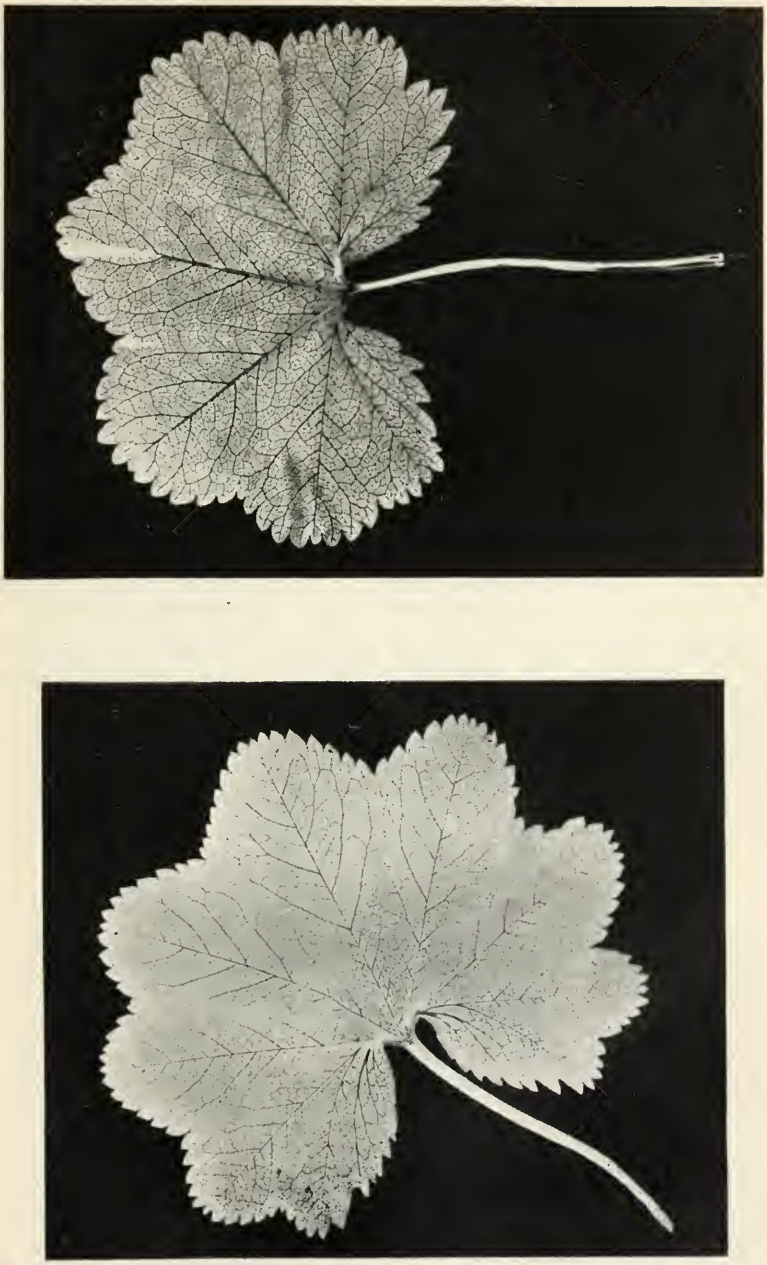
Mention must be made of Buser's *A. acuminatidens* (Bull. Herb. Boiss. xi, 624, 1902) and the following are the chief distinctions there given to separate it from *A. acutidens*:—

A. acutidens.	*A. acuminatidens.*
Leaves glabrous above or silky along the folds and on the teeth, beneath ± silky along the edges, on the front part of the lobes and on those adjacent to the petiole; teeth numerous (6) 7–9 on each side, narrower and closer together, very equal, with the exterior edge more curved, connivent upon the lower leaves, strongly ciliate and penicillate; terminal tooth almost equalling the lateral.	Leaves glabrous above, beneath faintly silky upon the front part of the edges; teeth 5–7 on each side, unequal, acute, with the exterior edge straighter and thus the teeth more like a saw and spread out, faintly ciliate; terminal tooth small.
Urceoles turbinate, with the base elongated.	Urceoles campanulate or turbinate, with the base abrupt.
Styles almost double the length of the filaments.	Styles not exceeding the filaments.
Pedicels (2–5 mm.) equalling 2–2½ times the urceoles, upper pedicels of the cluster equalling the urceole.	Pedicels equalling 1⅓–1½ times the urceoles, the upper ones of the cluster one-third shorter than the urceole.

Buser concludes by observing:—"Generally *A. acuminatidens* does not attain that degree of slender elegance that distinguishes *A. acutidens*, the plant is more thick-set, the toothing coarser and more unequal, the inflorescence more condensed, the flowers more contracted and smaller. The amount of hairiness is half that of



Leaves of *A. acutidens* var. *alpestriformis*, from Ben Lawers.



Leaves of *A. alpestris*, from Clova, Forfar.

acutidens and about like that of *A. alpestris* Schmidt, with which *acuminatidens* has a certain superficial resemblance. The very rounded or suborbicular leaves seem to me to meet more rarely, and the lobes to be less deep than in *acutidens*."

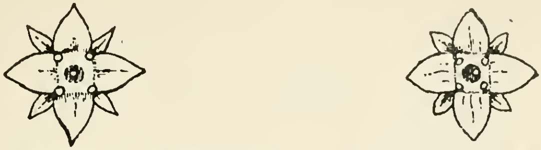
I do not think the characters regarding the length of style or pedicel can carry much weight, as undoubted *A. acutidens* has the former shorter, as long as, or longer than, the filaments, whilst the pedicels vary greatly in length on the same example.

I have not been able to see a type specimen of *A. acuminatidens*, but the example representing this species in Dörfler's Herb. Norm. 4660—"*f. vegeta, umbrosa*: revidit R. Buser" (where it is called a subspecies of *acutidens*) seems to me hardly separable from *A. alpestris*, of which it has the more coarse unequal toothing, more robust growth, less hairiness, &c.

It may be convenient to point out, in tabular form, what seem the chief distinctions of *A. alpestris*, *A. acutidens*, and its var. *alpestriformis*:—

A. alpestris.	*A. acutidens.*	var. *alpestriformis.*
Stems erect, glabrous, except for lowest internode (rarely to second) which has ± appressed hairs in small quantity.	*Stems* decumbent, densely hairy at base, diminishing upwards, usually glabrous above third internode, hairs ± appressed.	*Stems* decumbent, less hairy than type, often glabrous above second internode (rarely glabrous above lowest internode), hairs ± appressed.
Leaves with 7–9 obtusely triangular or rounded lobes, which are toothed all round; teeth 6–9 on each side, ± obtuse, broader than long, apical tooth smaller (rarely same size) and teeth ± irregular in size on same lobe.	*Leaves* with about 9 obtuse, rounded or even acute lobes, which are either toothed all round or entire at sinus for short distance (see fig. 1); teeth 7–9 on each side, acute, longer than broad, apical tooth uniform in size (rarely smaller), and teeth ± regular in size on same lobe.	*Leaves* of same shape and toothing as in type.
Leaves practically glabrous above; also below except for veins which (though sometimes practically glabrous also) usually have ± appressed hairs from apex to scarcely halfway to petiole, never to base.	Leaves practically glabrous above; also below except for lobes next petiole which have ± plentiful appressed hairs and veins with ± abundant appressed hairs along whole length.	Leaves practically glabrous above; also below, where (rarely) there are sparing appressed hairs on lobes next petiole, and veins ± sparingly hairy with appressed hairs from apex to halfway to petiole (rarely further).
Petioles usually practically glabrous, sometimes laxly-appressed hairs are present.	*Petioles* distinctly (usually densely) hairy with laxly-appressed hairs.	*Petioles* not so hairy as type (rarely almost glabrous), hairs appressed or slightly spreading.

Besides these differences, the shape of the flower seems also a character; in *acutidens* and its variety the sepals are more acute and taper more from their base, as compared with those of *alpestris* (see figures). Apparently, too, *A. acutidens* never becomes so coarse and robust as *A. alpestris* even in the most suitable positions, but retains its more graceful habit, with decumbent-ascending stems which never attain such a height as those of *alpestris*. The leaves of the latter, too, are not so strongly undulate as those of *acutidens*, but this character is quite lost in dried specimens.



Flower of *A. acutidens* var. *alpestriformis* Flower of *A. alpestris*
(each enlarged four times).

The shape of the lobes of the leaves of *acutidens* and var. *alpestriformis* is extraordinarily variable; Buser in describing *A. acutidens* (and the remark holds good with its variety) says (*l.c.* p. 104):—"Lobes rather deep . . . . *with differences of outline very pronounced according to age and position.*" Thus I have seen var. *alpestriformis* with flattened rounded lobes (similar to those of *A. acutidens* figured by Lindberg, *op. cit.* t. 17) on Meall Garbh, Perthshire, and plants with triangular-acute lobes (similar to those figured on t. 16) near Lochan nan Chat, Ben Lawers.

It must be borne in mind that the descriptions (both as regards shape and clothing) of the leaves given above are those taken from mature summer examples; the first spring leaves of *A. alpestris* are sometimes extremely like those of *acutidens*, but the later summer ones, when mature, are quite distinctive.

Synonymy and Distribution.

ALCHEMILLA ACUTIDENS Buser in Bull. Herb. Boiss. 1894, 104.

A. vulgaris L. var. γ *acutidens* Briquet in Burnat, Fl. Alpes-Marit. iii. 149 (1899).

A. vulgaris L. subsp. *A. connivens* Camus in Rouy Fl. Fr. vi. 451 (1900); non Buser.

A. vulgaris L. II. B. *A. alpestris* Schmidt. *A. eu-alpestris* A. & G. II. *acutidens* Aschers. & Graeb. Syn. Mittel. Fl. vi. 412 (1902).

A. acutidens Buser, ampl. Lindb. fil. Nord. Alchem. vulg.-formen, 111 (1909).

Iceland! Faroes, Norway! Sweden! Finland! Russia! Switzerland! France, Austria-Hungary, Italy.

Var. ALPESTRIFORMIS, var. nov.

A *Alchemilla acutidente* caulibus petiolisque minus pilosis, foliis fere glabris nisi tamen subtus nervibus in dimidio superiore pilosis, differt.

Scotland.—Perthshire: Ben Lawers, 800–1000 m.! 1911, *C. H. Ostenfeld.* Ben Lui! 1912, *W. G. Travis.* Meall-nan-Tarmachan! 1914, *R. C. Davie.* Meall Garbh, 3000 ft., 1913! Gleann Muilinn, Fortingal, 1800 ft. 1913!

The specimens collected by Mr. McTaggart Cowan at Hopetown, Linlithgow! (Bot. Ex. Club Report for 1910, p. 555) and referred by Mr. Druce (Journ. Bot. 1912, 201) to *A. acutidens*, are now named by Dr. Lindberg, *A. alpestris.* With this view I agree. I have not seen the Welsh specimens collected by Mr. Druce (see Journ. Bot. *l.c.*), so the Carnarvonshire locality is omitted for the present.*

Some confusion has been caused among British botanists by the plants distributed in 1911 by Mr. Druce as *A. vulgaris* L. var. *acutidens* from Ben Lawers, through the Exchange Club. Both *alpestris* and *acutidens* grow upon this mountain, and there is no doubt that both were dispersed through the Club, which accounts for the diverse views expressed in the Report for 1911, p. 84.

It may not be out of place here to draw up a short account of the remaining British species:—

KEY.

1 { Stems and petioles with spreading hairs 2
Stems and petioles glabrous or with ± appressed hairs 3

2 { Pedicels and urceoles hairy . . . . *A. minor* Huds.
Pedicels and urceoles glabrous . *A. pratensis* Schmidt.

3 { Petioles and stems ± glabrous; leaf-toothing irregular and teeth broader than long. Pedicels and urceoles glabrous . . *A. alpestris* Schmidt.
Petioles and stems with ± appressed hairs; leaf-toothing ± regular and teeth longer than broad. Pedicels and urceoles glabrous *A. acutidens* Bus. var. *alpestriformis.*

A. MINOR Huds. Stems densely hairy, with patent hairs from base to practically summit, usually scarcely diminishing in quantity even at apex. Petioles densely hairy with patent hairs. Root-leaves sparingly hairy on both sides, more densely on veins. Pedicels and urceoles more or less hairy with patent, normally plentiful, hairs.

Reported or I have seen specimens from the following vice-counties:—3, 4, 5! 6! 7! 8! 9, 12! 14! 16, 17! 18! 20! 21! 22, 23, 24, 26! 28! 30! 32! 34! 35! 36! 37! 38! 39! 40! 41! 42, 43, 49! 51! 53! 55! 56! 57! 59! 60, 61, 62! 63, 64! 65! 66! 69! 72! 73, 74! 77! 80! 81, 83! 84, 85! 88! 89! 90! 92! 94, 100! 105, 106, 107, 108! 111! 112!

Var. *filicaulis* Buser. Whole plant much less hairy, stems and pedicels practically glabrous, urceoles sparingly hairy or glabrous also.

---

* Since these lines were written Mr. Druce has kindly sent me his Nant Francon (Carnarvonshire) specimens collected in 1899. I fail to see how these can be placed under *acutidens*.

Only in Scotland = v.-c. 88 Perth mid.: near Caputh Bridge! 1889, *F. B. White*. Meall Greigh, 1913! V.-c. 90! v.-c. 97; v.-c. 111! v.-c. 112!

The plant from Orkney, v.-c. 111, in Hb. Kew, collected by Dr. Gillies in 1818, is much coarser and taller, but I think must be referred to this variety.

A. pratensis Schmidt. Stems densely hairy with patent hairs from base to practically summit, usually diminishing in quantity towards the apex. Petioles densely hairy with patent (and rarely appressed) hairs. Root-leaves glabrous above; sparingly hairy over surface beneath, more densely on veins. Pedicels and urceoles glabrous (rarely with a few patent hairs).

Vice-counties 3! 4, 5, 16! 17! 20! 23, 24! 34! 35! 38, 39! 41! 42! 44! 47! 54, 55, 57! 58! 59! 60! 62! 63! 64! 65! 67! 69! 70! 72! 73! 75! 76, 77! 79, 83! 84, 87! 88! 89! 90! 91! 92! 94! 99, 100, 106, 109, 111, 112!

A. alpestris Schmidt. Vice-counties 6! 14! 21, 24! 27! 39, 41! 43! 46! 48! 49! 55! 57! 58, 59! 60! 62, 64! 65! 66! 67! 69! 70! 72! 73! 74! 77! 78, 79, 81! 83! 84! 86! 87! 88! 89! 90! 92! 94, 95! 96! 97! 98! 99! 100, 101! 103! 104, 105, 106, 107, 108, 109! 110, 111!

It will be seen that, as far as Great Britain is concerned and as far as our present records stand, *A. minor* is the commonest and most widely spread form, occurring from Shetland to Devon and Suffolk to Carnarvon. *A. pratensis* is almost equally widely distributed, with a range from Shetland to Devon and Kent to Carmarthen, but seems to be absent from rather more counties than *minor*, particularly in the Ouse and N. Thames provinces. *A. alpestris*, obviously of a more northern type, occurs copiously in Scotland and the north of England, and reaches as far south as Norfolk, Leicester and Cardigan, with outlying colonies in Sussex, Middlesex, Buckinghamshire, Somerset, and Glamorgan.

For the loan of specimens and help in other ways my thanks are due to Professor I. B. Balfour, Dr. C. E. Moss, Dr. H. Lindberg, and Messrs. W. G. Travis, W. Barclay, C. Bailey, J. A. Wheldon, A. Bennett, J. W. White, G. C. Druce, and the Perth Museum authorities; the photographs of the leaves were kindly taken by my sister.

ALABASTRA DIVERSA.—Part XXV.

By Spencer Le M. Moore, B.Sc., F.L.S.

1. Plantæ Novæ Papuanæ, adjuvante H. N. Ridley, F.R.S.*

Begoniaceæ.

Begonia sogerensis Ridl., sp. nov. Rhizoma sublignosum. Caules herbacei, glabri, 30 cm. alti, fistulosi, ramosi, 5 mm. crassi, striolati, ramis hirtulis. Folia obliqua, oblongo-lanceolata, acu-

---

* The types of species described are in the National Herbarium.

minata, basibus valde inæquilateris, marginibus irregulariter dentatis, superne glabra, subtus nervis 5–8 paribus, furcatis, et costa hirtulis, 12–20 cm. longis, 4–9 cm. latis; petiolis 1–3·5 cm. longis hirtulis. Stipulæ lanceolatæ acutæ 5 mm. longæ. Panicula terminalis, ad 9 cm. longa, laxa, glabra, ramis 3 cm. longis. Bracteæ latæ, oblongæ, obtusæ, 3 mm. longæ. Flores masculi parvi, albi, pedicellis glabris vel hirtulis 3 mm. longis. Sepala 2, cordata, obtusa, 6 mm. longa, 7 mm. lata. Petala nulla. Antheræ sessiles, oblanceolatæ, obtusæ, haud appendiculatæ, circiter 50. Flos femineus 1–2, in axilla folii summi. Capsula oblonga, obovata, basi lato alis tribus æqualibus latis oblongis obtusis, 2 cm. longa, 2·5 cm. lata (alis in medio 5 mm. latis), pedicello 2 mm. longo.

British New Guinea, Mt. Sogere, at 2500 ft.; *H. O. Forbes*, 157, 261, 444.

Flowers white or greenish white.

Allied to *B. oblongifolia*, Stapf, but the leaves have larger and more irregular teeth; the bracts are larger and oblong, sepals cordate, fruit larger, and not narrowed to the base. The lower part of the stem is almost or quite glabrous, often with small elevations where the scanty trichomes have fallen away.

ARALIACEÆ.

Schefflera Forbesii Ridl., sp. nov. Arbor medius, caule ad apicem 2 cm. crasso. Folia 9–11-foliolata, petiolis 18 cm. longis, petiolulis 2·5–3·5 cm., furfuraceis, pilis pallidis ad basin verticillatis, foliolis oblongis, lanceolatis, cuspidatis, obtusis, basibus cuneatis, coriaceis, glabris, 13 cm. longis, 4·5 cm. latis vel minoribus, marginibus incrassatis, nervis 6 paribus. Stipulæ lanceolatæ, acuminatæ, 2·5 cm. longæ, pilis magnis ad bases. Panicula magna, 24 cm. vel ultra longa, ramis pluribus, remotis 45 cm. longis. Pedunculi umbellarum 1–1·5 cm. longi. Pedicelli 5 mm. longi. Ovarium semi-ovoideum, 1 mm. longum. Discus rugulosus, undulatus, coriaceus. Petala 5, transverse oblonga, truncata, latiora quam longiora, pallida, 1 mm. longa. Stamina 5, flava, antheris latis oblongis, filamentis brevissimis antheris æquilongis. Bacca 5 mm. longa, oblonga, apice convexa, 5-loba, 5-locularis, stigmatibus brevissimis. Semen semilunare, basi lato, superne acuminatum.

British New Guinea, Mt. Sogere; *H. O. Forbes*, 297, 651.

Fruit purplish pink.

Allied to *S. Junghuhnii* Miq., but the stamens are much shorter and the disc is flatter.

Schefflera bractescens Ridl., sp. nov. Caulis pallidus, 1 cm. crassus. Folia 10-foliolata, petiolis validulis, petiolulis 6–8 cm. longis, foliolis tenuibus, papyraceis, lanceolatis, apicibus cuspidatis, basibus cuneatis, glabris, nervis 5–6 paribus, tenuibus, 16–18 cm. longis, 7–8 cm. latis. Panicula 30 cm. longa, ramis dissitis, gracilibus, 15–20 cm. longis. Bracteæ ad bases ramorum lanceolatæ, obtusæ, albo-hirsutæ, 1·5 cm. longæ, 3 mm. latæ. Pedunculi 1 cm. longi, dissiti. Umbellæ circiter 6-floræ, pedicellis

2 mm. longis. Ovarium breve, turbinatum. Calycis margo vix distincta, integra. Corolla et stamina non visa. Bacca carnosa, 5-angularis, 5-locularis, apice convexo, stigmatibus brevibus.

British New Guinea, Mt. Sogere, at 2500 ft.; *H. O. Forbes*, 47. "Small tree."

Allied to *Sch. polybotrya* Miq., but the leaves are thinner in texture, and the large bracts at the base of the branches of the panicle are not to be seen in that species.

MYRSINACEÆ.

Mæsa rubens, sp. nov. Arbuscula, ramulis sat validis crebro lenticelliferis, foliis ovato-oblongis sub apice cuspidato-attenuatis margine obscure undulatis chartaceis utrinque glabris punctisque prominulis destitutis, racemis in axillis foliorum vivorum nisi jam delapsorum solitariis paucisve quam folia certe brevioribus laxifloris gracilibus glabris, pedicellis floribus longioribus, bracteis parvulis ovatis, calycis 5-meri alte partiti segmentis late ovatis obtusissimis minute crenulatis subtiliter rubro-lineatis necnon juxta marginem punctatis, corolla fere medium usque divisa lobis semi-orbicularibus per anthesin reflexis rubro-lineatis, staminibus subinclusis paullo infra fauces corollæ insertis filamentis quam antheræ brevioribus medio dorsifixis, ovario $\frac{1}{2}$ infero, stylo brevi, stigmate obtuso.

British New Guinea, Mt. Sogere, 3000 ft.; *H. O. Forbes*, 90.

Arbuscula sec. cl. Forbes ± 20 ped. alt. Folia usque ad 16 × 7 cm., sæpe vero minora sc. 12 × 5 cm., supra in sicco griseola, subtus rubiginosa, obscure imperfecteque reticulata, costæ laterales in toto 12 marginem versus arcuatæ, ut costa centralis pag. inf. eminentes; petioli validi, superne excavati, summum 1 cm. long. Racemi 3–5 raro 6 cm. long. Pedicelli modice 2 mm. long. Bracteæ ·5 mm. long. Calyx 1·25 mm. long. Corolla dilute viridis, 1·75 mm. long.; tubus 1 mm.; lobi ·75 mm. long.; basi 1 mm. lat. Antheræ ovatæ, obtusissimæ, ·5 mm. long. Ovarium 1 mm. long., superne rugatum. Stylus incurvus, circa ·4 mm. long.

Near *M. protracta* F. Muell., also from British New Guinea, which has longer stalked lanceolate leaves and flowers different in several respects. *M. lævigata* Scheff., with larger similar foliage has, according to the description, more shortly pedicelled flowers, acute sepals and acute anthers.

Ardisia (ACRARDISIA) **Forbesii,** sp. nov. Fruticosa, ramosa, ramis patentibus subteretibus basi dilatata cauli insidentibus microscopice lepidotis, foliis petiolatis obovato-oblongis acuminatis apice obtusis basi obtusis margine crenulatis chartaceis utrobique glabris punctulis prominulis omnino destitutis (rarissime perpaucis prope apicem sitis donatis), floribus pro rata parvis in paniculas terminales foliis sæpius breviores subtilissime ferrugineas ordinatis, inflorescentiis partialibus pluribus umbellatis corymbosisve, pedicellis gracilibus calyces excedentibus, calycis segmentis per anthesin apertis ultra medium sejunctis ovatis acutis margine ciliatis nigro-punctatis, corollæ alte partitæ segmentis ovatis acutis punctis perpaucis obscurioribus signatis, filamentis brevibus antheris corolla brevioribus apice acutis impunctatis, ovario ovoideo glabro stylo longiore coronato, bacca parva globosa levi.

British New Guinea, Mt. Sogere, 2000 ft.; *H. O. Forbes*, 120, 483, 656.

Folia usque ad 16 × 5 cm., complura ± 10 × 3–4·5 cm., in sicco griseo-viridia; petioli circa 5 mm. long., validi, late canaliculati. Inflorescentiæ circiter 10 cm. long. Pedicelli plerique 3–5 mm. long. Calyx 1 cm. long. Corolla dilutissime punicea, 2·5 mm. long. Filamenta ·5 mm., antheræ 1·5 mm. long., hæ basi cordatæ. Ovarium 1 mm. long. Stylus crassiusculus, glaber, ovario circa æquilongus. Bacca in sicco 5 mm. diam., brunnea.

This, it is to be presumed, should be inserted next to *A. javanica* A. DC., a species with smaller, plentifully punctate leaves, much larger flowers, punctate stamens, &c.

Ardisia (Tinopsis) **venusta**, sp. nov. Fruticosa, erecta, ramulis subteretibus sat crebro foliosis, foliis ovato-oblongis prope apicem attenuatis apice acutis basi in petiolum brevem validumque cuneatim angustatis margine integris tenuiter coriaceis glabris utrinque pagina tota punctulis parvis eminentibus præditis, panicula terminali foliis breviore floribus apicem versus ramulorum patentum racemosis vix subcymosis, pedicellis flores plane excedentibus patentibus glandulis minutis lucentibus inspersis, calycis segmentis sæpius dextrorsum obtegentibus basi connatis suborbicularibus margine purpureis microscopiceque serrulato-ciliolatis medio punctulis brunneis crebris indutis, corollæ segmentis ima basi solummodo connatis latissime ovatis sursum rotundatis pluripunctatis, antheris sessilibus corollæ segmentis paullo brevioribus acuminatis dorso fusco-punctatis, ovario late ovoideo glabro in stylum crassiusculum desinente, baccis coccineis purpureisve globosis stylo persistente acuminato terminatis.

British New Guinea, Mt. Sogere, 2000 ft., Korkoko Range, 2500–3000 ft., and near Meroka; *H. O. Forbes*, 54, 118, 364, 490, 665, 791.

Folia pleraque circa 15 × 5·5 cm., summum 19 × 6 cm., supra in sicco fusco-subtus griseo-viridia; costa centralis pag. inf. maxime eminens; reticulum pag. eadem perspicuius; petioli sæpius 5–10 mm. long., canaliculati. Inflorescentiæ ± 8 cm. long., usque ad 10 cm. lat., raro latiores. Pedicelli sæpe fere 15 mm. long., interdum vero ± 12 mm. Flores rubro-purpurei, crassiusculi. Calyx 3 mm. long. Corollæ segmenta 9 mm. long., 6 mm. lat. Antheræ 7 mm. long. ambitu triangulares. Ovarium 2 mm., stylus 4 mm. long. Baccæ in sicco 7 mm. diam.

This should be inserted in the genus next *A. lanceolata* Roxb. The chief peculiarities are the leaves uniformly dotted all over instead of near the margin alone, the fleshy not hard and firm calyx and corolla, the very broad segments of the corolla, and the sharply pointed berries.

ASCLEPIADACEÆ.

Hoya (§ EU-HOYA) **sogerensis**, sp. nov. Planta scandens, caule satis valido folioso interdum radicante, foliis per rata magnis ellipticis vel elliptico-oblongis breviter acuminatis apice obtusis basi obtusis 5-nervibus carnoso-coriaceis glabris petiolis sat longis incrassatis insidentibus, pedunculis robustis foliis multoties brevioribus, umbellis circa 20-floris, pedicellis tenuibus pedunculo sæpissime brevioribus et pedunculis omnino glabris, calycis parvuli segmentis ovatis obtusis glabris, corolla mediocri rotata ultra medium divisa lobis rhombeo-ovatis acutis recurvis intus prope basin glabris alibi minute papillosis, coronæ phyllis horizontalibus apice (interne) obtusis superne ovatis medio concavis postice acutis lateribus oblongis crassiusculis, antherarum alis optime prominentibus, polliniis oblongo-pyriformibus apice obtusissimis, glandula ovata caudiculas teneras duplo excedente.

British New Guinea, Mt. Sogere, 1750–2000 ft.; *H. O. Forbes, sine no.*

Caulis sæpius 2–3 mm. diam., nonnunquam usque ad 4 mm. Folia pleraque 10–16 × 3–4 cm., in sicco viridi-grisea; nervi utrinque eminentes; petioli 1–2 cm. long., superne canaliculati, summum 5–6 mm. diam., sæpissime vero tenuiores. Pedunculi 2–4 cm. long.; pedicelli 17 mm. Flores pedicellique purpurei. Calycis segmenta ægre 2 mm. long. Corolla circa 12 mm. diam.; lobi 4·5–5 × 5 mm. Coronæ phylla (sensu radiato) 4 mm. long., superne 2 mm. lat. Pollinia ·6 mm., glandula ·25 mm. long.

Judging from the description, this should be placed next *H. marginata* Schlechter, which, *inter alia*, has larger and broader acuminate leaves and a corona diverse in some respects.

Hoya (§ EU-HOYA) **lactea**, sp. nov. Caule scandenti crasso satis crebro folioso foliis petiolatis oblongo-ovatis apice rotundatis ipso interdum brevissime acuteque cuspidulatis basi rotundatis levissime cordatis carnoso-coriaceis utrinque glabris, umbellis circiter 10-floris, pedunculis validis quam pedicelli gracillimi necnon puberuli brevioribus, calycis segmentis ovatis obtusis glabris, corolla pro rata mediocri rotata ultra medium lobata extus glabra intus basi glabra alibi et in lobis subtiliter puberula lobis rotundato-ovatis breviter acuminatis, coronæ phyllis crassis apice (interne) erectis acutisque externe ascendentibus et gynostegium superantibus superne ovatis concavis postice obtusis lateribus rotundatis crassiusculis, polliniis oblongo-pyriformibus obtusissimis caudiculis perbrevibus glandulæ oblongæ affixis.

British New Guinea, Mt. Gandada, 3000 ft.; *H. O. Forbes*, 872. Without locality; *id.*, 925 in part.

Folia sæpissime 9–12 cm. long., 4·5–6·5 cm. lat., in sicco viridi-grisea, pag. sup. aliquantulum nitidi; costa media pag. inf. prominens; costæ laterales ut reticulum mediocriter eminentes; petioli 10–18 mm. long. Pedunculi 1·5–2 cm., pedicelli 3 cm. long. Flores lactei. Calycis segmenta fere 2·5 cm. long. Corolla pansa circa 13 mm. diam., pars indivisa 3 mm. lobi 4·5 mm. long. Coronæ phylla vix 3 mm. long. (sensu radiato). Pollinia ·6 mm., glandula ·35 mm. long. Folliculi 16 cm. long., juxta medium 5–6 mm. lat., superne gradatim angustati, puberuli.

This is perhaps near *H. montana* Schlechter, but the foliage and flowers are different in several respects.

Hoya (§ Eu-Hoya) **pachypus**, sp. nov. Caule scandenti crasso distanter folioso glabro, foliis petiolatis late ovato-oblongis interdum fere subquadratis utrinque rotundatis apice sæpe mucronatis crasse coriaceis pag. utraque glabris, umbellis circiter 20-floris, pedunculis incrassatis glabris foliis multo brevioribus, pedicellis teneris puberulis pedunculis subæquilongis, floribus submediocribus, calyce quam corolla plane breviori segmentis ovato-lanceolatis obtusis extus puberulis, corolla rotata ultra medium lobata lobis deltoideo-ovatis acutis marginem versus pag. sup. papillosis alibi glabris, corona parva a gynostegio facile superata phyllis horizontalibus apice (interne) erectis obtusiusculisque superne ovatis necnon planis postice (externe) obtusis lateribus reflexis angustis, polliniis oblongis obtusis glandulæ parvæ anguste oblongæ conjunctis.

British New Guinea, Sogere Region; *H. O. Forbes, sine no.*

Caules 5 mm. diam., in sicco subquadrangulares, dilute brunnei. Folia 6·5–8 × 4–5 cm., siccitate brunnescentia; costa media subtus prominens; nervatio haud perspicua; petioli validi, superne canaliculati, puberuli, circa 1·5 cm. long., 2 mm. crass. Pedunculi 1–2 cm. long., usque ad 2 mm. diam.; inflorescentiæ axis incrassatus 4–12 mm. long. Pedicelli 1–1·5 cm. long. Calyx 2 mm. long. Corolla pansa 8 mm. diam.; pars indivisa 1·5 mm. long., lobi 2 mm. Corona (sensu radiato) summum modo 1 mm. long. Pollinia ·65 mm., glandula ·3 mm. long.

The relatively short and broad leaves with the small flowers and reduced corona shorter than the gynostegium are the chief points of the species.

ACANTHACEÆ.

Ruellia (Leptosiphonium) **Forbesii**, sp. nov. Caule herbaceo erecto tetragono puberulo dein glabrescente, foliis amplis petiolatis oblongo-ovatis prope apicem angustatis apice obtusis basi rotundatis nisi obtusis margine undulatis firme membranaceis supra glabris leviterque nitentibus subtus opacis necnon subobsolete puberulis, floribus magnis in axillis summis solitariis vel cymam brevem terminalem perpaucifloram efformantibus, bracteis bracteolisque lineari-subulatis ut pedicelli quam calyx plane brevioribus, calycis alte partiti segmentis linearibus acuminatis puberulis, corollæ tubo maxime elongato attenuato extus pubescente limbo tubo multo breviore hujus lobis suborbicularibus, ovario oblongo ut stylus glabro, ovulis quove in loculo 16.

British New Guinea, Mt. Sogere, at 2000 ft.; *H. O. Forbes*, 839*a*.

Folia summum 12 × 5·5 cm., sæpius vero minora, sc. ± 8 × 3·5 cm., in sicco griseo-viridia, pagina utravis cystolithis copiose inspersa. Pedicelli ± 5 mm. long., validi. Bracteæ ± 5 mm., bracteolæ circiter 3 mm. long. Calyx 18 mm. long.; segmenta 16 mm. long., sub lente minute puberula. Corolla dilute flava;

tubus 5·5 cm. long., in sicco 2 mm. lat.; lobi circa 2 cm. long. Antheræ subinclusæ, lineari-oblongæ, obtusæ, dorso pilosulæ, 3 mm. long. Ovarium 5·5 mm. long.

The same collector's No. 509, also from the Sogere region, is conspecific with this, differing from it only in its lanceolate leaves, 8–13 cm. long and 3–3·5 cm. broad.

This species is allied to the Papuan *Ruellia Stricklandii* Lindau (*Leptosiphonium Stricklandii* F. Muell.), known to me by description alone, but the leaves and calyx of the two are different.

R. Stricklandii has honeycombed pollen, according to Lindau,* who examined material F. Mueller sent him (Lindau incorrectly says the plant is a native of Australia). A specimen at Kew, not communicated by Mueller, the anthers of which contain spiny pollen, C. B. Clarke has supposed to be conspecific with Mueller's plant, in spite of Lindau's statement above, but neither this nor any other specimen seen at Kew answers Mueller's description of *L. Stricklandi.*

Aporuellia versicolor, sp. nov. Caule herbaceo erecto ramoso ramis sparsim piloso-pubescentibus deinde glabrescentibus, foliis brevipetiolatis ovatis vel ovato-oblongis apicem versus attenuatis apice obtusis basi obtusis vel obtusissimis raro late truncatis margine undulatis membranaceis supra cito glabris subtus præsertim in nervis fulvo-pubescentibus tandem glabris, floribus magnis breviter pedicellatis in cymam terminalem brevem paucifloram digestis, bracteis bracteolisque calyce certe brevioribus linearibus acuminatis puberulis, calycis alte partiti segmentis elongatis linearibus acuminatis puberulis, corollæ tubo calycem longe superante attenuato ipso sub limbo dilatato extus subtiliter pubescente basin versus glabro lobis suborbicularibus tubo multo brevioribus, antheris subinclusis, ovario anguste oblongo glabro, stylo pubescente, ovulis pro loculo circa 20.

British New Guinea, Mt. Sogere, 1750–2500 ft.; *H. O. Forbes*, 73, 781.

Folia summum 14 × 5·5 cm., sæpius 6–10 × 3–4 cm., in sicco griseo- vel brunneo-viridia, pag. inf. pallidiora, cystolithis obscuris dense obsita; petioli ± 5 mm. long., late canaliculati, pubescentes. Pedicelli summum 7 mm. long., sed sæpe breviores. Bracteæ bracteolæque circa 7 mm. long. Calyx 22 mm. long. Corolla gilva (No. 73) vel vivide aurantiaca (No. 781); tubus 6 cm. long., 2 mm. lat., basin versus 3 mm.; lobi circa 1·5 cm. long. Antheræ oblongæ, obtusæ, glabræ, 4 mm. long. Pollinis grana tuberculis parvulis obsita. Ovarium 6 mm. long.

Externally this is much like the plant just described, but, neglecting other features, the pollen of the two is quite different. *Ruellia Guppyi* Hemsl. is plainly a congener, for C. B. Clarke has notified it (MS. in Hb. Kew.) as having spiny pollen, and it thus becomes *Aporuellia Guppyi* Clarke; from this plant, however,

---

* Pflanzenfam. iv. 3b, p. 309.

A. versicolor differs in foliage, calyx and corolla. Neither can it, although in large measure homoplastic with, be referred to *R. vestita* Engl., *R. Garckeana* K. Schum., nor *R. potamoxenos* K. Schum., all of which, according to Lindau, have honeycombed pollen, and are thus true Ruellias, as is *R. aruensis* S. Moore from the Aru Islands. The fact is that in New Guinea and the neighbouring islands we have a series of homoplasts differing chiefly as to whether their pollen is honeycombed (*Ruellia*), or spiny or at least tuberculate (*Aporuellia*).

Aristolochiaceæ.

Aristolochia pithecurus Ridl., sp. nov. Frutex scandens, elatus, caule 1·5 cm. crasso, cortice rugoso, ramis pubescentibus. Folia juvenia undique pubescentia, adulta coriacea, superne levia, glabra, subtus præsertim in nervis hirta, oblonga, cuspidata, basi cordata, 12 cm. longa, 6 cm. lata, nervis 3-paribus, subtus distinctis, reticulatis, petiolis tortis, 1 cm. longis, pubescentibus. Flores sessiles. Bracteæ tubulosæ, dilatatæ, latæ, 1 cm. longæ, hirtæ. Corolla tubæformis, 3·5 cm. longa, extus hirta, pallide viridis, purpureo-reticulata, basi dilatato 1 cm. longo, hinc angustato, superne dilatato, limbo 1·4 cm. lato, lobis tribus, rotundatis, 4 mm. longis, uno filiformi, obtuso, gracili, hirto, 1·5 cm. longo. Andrœcium 2 mm. longum, sessile, antheris 6, linearibus, connatis. Styli cylindrici, obtusi, sulcati.

British New Guinea, Mt. Korkoko, at 2500 ft.; *H. O. Forbes*, 621.

"A considerable climber. Flowers with ground colour pale green covered with a network of purple lines."

This curious plant is allied to *A. Balansæ* Franch. of Cambodia, differing in its cordate leaves.

The corolla has three rounded short lobes, and one slender, filiform one slightly dilated towards the tip and resembling a monkey's tail.

(To be continued.)

PETER EWING.

(1849–1913.)

Many field botanists, both in Scotland and England, must, like myself, have felt keen personal regret when they heard in the autumn of last year of the death on August 3, at Glasgow, of Peter Ewing. For nearly half a century he had devoted all his spare time to the study of the flora of his native land, and the knowledge which he had thus acquired he was always ready to impart to others.

Peter Ewing was a native of Kinross, where he was born in 1849. His father was a stationer in a small way, and to this business he afterwards added that of photographer. His children, of whom there were six sons and two daughters, had to learn at an early age that work is the lot of man. Peter, the second son, received a somewhat meagre education, and after assisting his father for some years, at the age of seventeen was sent to learn the trade of joiner. Removing afterwards to Glasgow, where he attended evening classes for a time and thus to some extent made up for the defects of his early training, he obtained a post in the Phœnix Fire Assurance Association. By the ability and by the zeal with which he performed his work, he obtained promotion and finally attained the important position of local or district secretary. This he held until his retirement shortly before his death, which took place on August 3, 1913.

Ewing's interest in plants began when he was still a boy, and increased as years went on. He took advantage of every opportunity to search for new plants, so that when in 1879 he became a member of the Glasgow Natural History Society he was already a competent field botanist as to flowering plants; he had also devoted a good deal of attention to mosses and hepatics. He took a prominent part in the work of the Society, often acting as botanical leader at the excursions. He several times filled the office of Vice-President, and for a period occupied the President's chair.

Most of Ewing's published work consisted of papers contributed to the Transactions of the Society. The first of these—a list of the flora of Ben Laoigh, its phanerogams, mosses, and hepaticæ—was published in 1883. Next year he gave an account of an excursion to Ben Lawers and Creag-an-lochan, with a long list of the plants found, and in the same year was read a valuable paper entitled "A week in Glen Shee." Several "Contributions to the Topographical Botany of the West of Scotland" appeared at intervals from 1887 onwards, and the results of these were embodied in the *Glasgow Catalogue of Native and Established Plants* in 1892. Of this a second edition, which was noticed in this Journal for 1899 (p. 276), was published in that year. During his later years Ewing paid special attention to our mountain Carices, upon which he held views which did not always coincide with those of experts: of these he contributed numerous specimens to the Botanical Exchange Club, of which he was a member.

Ewing had an intimate acquaintance with the flora of our Scottish mountains, especially with that of Clova and Breadalbane. He was not happy unless he visited Ben Lawers once or twice every year. He was familiar with the mountain under all aspects, had climbed it in dry weather and in wet, in sunshine and in shade, in clear air and in dense mists, and to be in the west corry when one cannot see two yards in front is not a particularly enviable experience.

Of tall stature, and of rather spare but sinewy build, Ewing could undertake the longest tramp and the stiffest climb, and was a skilful and daring cragsman. Few have so often explored the corries of our Highland hills, few could ascend or descend them with surer foot, and few have taken more delight in searching out and studying their floral treasures.

When, not having seen him for many years, I met him in Dundee in the September before his death, Ewing appeared quite hale in body and mind. On one day of that week we walked up Glen Phee together, and spent the hours in botanical talk, recalling excursions of former days with Buchanan White, Ferguson of Fearn, and others now no more, to me at least. Little did I then think that I should never meet him again!

Ewing was twice married; by his first marriage he had three sons and four daughters, all of whom survive. His widow is also an accomplished field botanist. He was elected a Fellow of the Linnean Society in 1894.

W. Barclay.

[The accompanying portrait is, by the courtesy of Mr. George Goode, reproduced from the Report for 1912–13 of the Watson Botanical Exchange Club, which contains a short notice of Ewing. A long and interesting account of him, by the late William West, appears in the Report of the Botanical Exchange Club for 1913, pp. 378–81.—Ed. Journ. Bot.]

JONATHAN STOKES AND HIS *COMMENTARIES.*

By James Britten, F.L.S., and G. S. Boulger, F.L.S.

It would be interesting to know more than we do of Dr. Jonathan Stokes, the editor of the second edition of Withering's *Botanical Arrangement.* The fullest account of him that has yet appeared is that by Mr. Bagnall in his *Flora of Staffordshire.*[*] From this we learn that Stokes was born at Chesterfield, Derbyshire, in 1755. He was thus fourteen years junior to Withering and to the younger Linnæus, four years older than James Edward Smith, and six years older than Richard Anthony Salisbury. He graduated as M.D. at Edinburgh in 1782, and was thus, like Pulteney, Withering, Smith and Rutherford, a pupil of John Hope (1725–1786), who was the first to teach the Linnean system in Scotland. Smith was probably his contemporary as an undergraduate; and he probably, like Smith, made the acquaintance of Broussonet at Edinburgh in the year in which he graduated. If he ever actually met the younger Linnæus (1741–1783), of whom he writes as his friend, it must apparently have been between May and August, 1781, when the Swede was staying with Banks in Soho Square. That Stokes was in London about this time is apparent from his own note (*Commentaries*, cxv.) that he drew up a catalogue of the garden of John Fothergill at the request of the executors, Fothergill having died on December 20th, 1780, and the plants being sold by auction on August 20th, 1781. Writing to congratulate Smith "on being the possessor of the cabinet and MSS. of the great Linnæus and of his excellent and amiable son, whose loss I shall ever most sincerely regret as a friend as well as a lover of natural history," he signs himself "Your old fellow-student," and asks for the return of a letter of his "to young Linné."[†]

Stokes was also personally acquainted with L'Héritier, who sent him specimens for his herbarium: he writes: "L'Héritier and Broussonet I much esteem, and I remember with pleasure the civilities I received from several other naturalists of that nation."

It would appear from references in the *Commentaries* that Stokes visited France, Holland, Germany and Austria, in which countries he speaks of having "gathered" plants. He apparently practised first at Stourbridge, Worcestershire, from which place the letter just quoted, in which he offers to buy any duplicates of British or European plants in the Linnean herbarium, is dated; and there too he seems to have married in 1784. His bride, a Miss Rogers of Dronfield, Derbyshire, was an intimate friend of Anna Seward, "the Swan of Lichfield," and had herself written poetry.[‡]

---

[*] *Journal of Botany*, 1901, Supplement, p. 70.

[†] *Correspondence* of J. E. Smith, i. 119–121, where are three letters from Stokes.

[‡] *Letters of Anna Seward* (1811) vol. i. p. 167, ii. 61. Among these letters sixteen are addressed by Miss Seward to Mrs. Stokes.

Withering had an extensive practice in Birmingham. Born at Wellington, Shropshire, in 1741, and the intimate contemporary of Pulteney at Edinburgh, where he graduated M.D. in 1766, he had practised at Stafford from 1767 to 1775, and seems to have collected plants in that neighbourhood in company with Stokes, at a later period. The first edition of his *Botanical Arrangement* had been issued in 1776, within a year of his migration to Birmingham, which was nearly coincident with the arrival of James Watt as the partner of Boulton at the Soho Works. Chemical researches to combat the phlogiston theory, mineralogy, and the abolition of the slave trade, engaged much of his attention; and, after his move to Edgbaston Hall in 1786, he also amused himself by breeding Newfoundland dogs and French cattle. He may, therefore, have been glad to delegate much of the labour of preparing a new edition of his botanical work to younger hands. He constantly employed two collectors to bring him plants, and it is probable that Stokes, with whom he was then apparently on terms of close friendship, then lived for a time in Birmingham. "It is evident," as Mr. Bagnall says,* "that Stokes had free access to Withering's extensive botanical library for the purpose of obtaining the new and valuable set of references" in the second edition of the *Botanical Arrangement*; and, Mr. Bagnall adds:—"A schedule is still in existence showing that Withering lent Stokes one hundred and forty-five botanical works, ranging from the earliest botanical writers to those of the then most recent times. These Stokes took with him first to Shrewsbury,† and afterwards to Kidderminster, and retained them for more than three years. It seems to have been due to Stokes's refusing to return them that he and Withering ceased to be on friendly terms; ultimately, by resorting to legal aid, Withering regained his botanical library."

In the copy of Banks's correspondence in the Department of Botany is an interesting letter (hitherto unpublished) from Withering to Banks dated from Birmingham, 6th Oct. 1787. This evidently was accompanied by the first two volumes of the *Botanical Arrangement* which appeared in that year: vol. iii. was not published until 1792. It runs thus:

"Sir,

"Following, though at an humble distance, in that path of Science in which you so conspicuously lead the way, I presume to solicit your acceptance of the enclosed Volumes, as a small addition to your immense collection on the same subjects.

"It was the inspection of your British Herbarium, when deposited many years ago at the house of our friend Sneyd at Bishton, which first aided and determined my pursuit in this branch of Science, so that you have a sort of right to that which had probably never existed but for your previous labours.

---

* *Loc. cit.*

† In a letter dated of August, 1786, Miss Seward promises to recommend Stokes as a young physician to friends in Shrewsbury.

I remain, Sir, with the greatest respect,
Your very obedient serv^{t},
W. WITHERING."

In the list of those who had assisted in the second edition (p. xii.) Stokes appears as "Dr. Stokes, Member of the Royal Medical Society of Edinburgh, corresponding Member of the Society of Antiquaries of Scotland, Physician at Shrewsbury"; but his own "Advertisement by the Author of the References to Figures" is dated, on p. xxxviii. of the same volume, "Kidderminster, 10th August, 1787"; and on the title-page he is described as "Late President of the Royal Medical Society" and as "Physician at Kidderminster."

Withering in his Preface pleads "the multiplicity of his own professional engagements" as his reason for asking the assistance of others, and shows a full appreciation of the value of Stokes's work, though, both here and elsewhere, he evinces but little sense of the importance of synonymy as such.

"The Latin Synonyms of Bauhine, Gerard, Parkinson and Ray, which occupied so much space in the first edition, are," he writes,* "now omitted; partly because they could be of little use to those who do not understand the Latin language, for they who do, may get the references from Hudson's *Flora Anglicà*; and partly to make room for a new set of references to figures, which my friend Dr. Stokes undertook to furnish. These references make one of the most valuable parts of the present Edition. Nothing short of his extensive knowledge of the subject, joined to an indefatigable industry, could have effected the reformation required; but the full force of his exertions will only be understood by such as have laboured at the subject themselves, and experienced the difficulty of marshalling error crowded upon error, into regular and beautiful order." An indication of the thoroughness of Stokes's work is the statement which he makes † that he had inserted no figures which he had "not examined and compared, unless the contrary is expressly noticed": a further indication of this will be found in the "Catalogue of Botanical Works" which follows the "Advertisement."

It would seem that Stokes's assistance did not extend to the whole work. This may be alluded to in the phrase "undertook to furnish" in the passage above quoted; whilst in his Preface to the third edition (1796) Withering writes ‡:—"The references to figures so ably executed by Dr. Stokes for a great part of the second edition are mostly preserved in this, though not without some changes in the order of excellence, the erasure of a few which were found to be erroneous, and of others which were thought too bad to be quoted. The historical facts relative to the older figures, stating which are copies and which originals, though perhaps thought curious by some few people, are omitted, partly because they are foreign to the purpose of this work, and partly to make room for additional references now given to infinitely better figures."

---

* *Botanical Arrangement*, ed. ii. vol. i. p. v.

† "Advertisement," *Botanical Arrangement*, ed. ii. p. xxx.

‡ Page vi.

This Preface was retained in subsequent editions; but the interesting running comments with which Stokes accompanied his lists of authorities in the second edition of Withering, and in his own subsequent works, no longer appear in the editions of the former for which Withering and his son were solely responsible.

The genus *Stokesia* was described by L'Héritier,[*] during the fifteen months of assiduous toil in 1786–7 when he was in London with Redouté, Broussonet, and the Dombey herbarium[†]; but in founding it he says nothing as to the man whose name it bears. In 1790 Stokes was elected an Associate of the then recently founded Linnean Society; and, though we have no evidence of his taking much, if any, part in the progress of British botany after the publication of his edition of Withering, his two later works were both essentially botanical.

In the Linnean Society Lists for 1792 and 1794 Stokes is described as of Kidderminster, and in those from 1796 to 1830 inclusive as of Chesterfield.

In 1796 Miss Seward stayed ten days with Dr. and Mrs. Stokes at Chesterfield.[‡] She writes[§] of Stokes as "a worthy and ingenious man, but a dissenter, and consequently a democrat," and she elsewhere[||] speaks of his political sentiments having been injurious to his interest. In 1798 Dr. and Mrs. Stokes stayed with Miss Seward for three days at Matlock and at this time Miss Seward writes[¶] to a friend:—

"Dr. Stokes is an extremely skilful physician, on the testimony of the ingenious and candid of his own profession, and on the proofs of his successful treatment of several very difficult and dangerous cases. His devotion to the study of medicine, and those sciences most nearly connected with it, as chemistry, botany, and mineralogy, has not allowed him to cultivate his taste for eloquence and poetry, sufficiently to authorize those unhesitating decisions on their subjects, which have often more tenacity than happiness. His voice in speaking, and his address, have each that insinuating softness which his wife's want, and which evince at once the man of education and the gentleman. It is curious to observe how totally these graces forsake him when he reads either oratoric prose or verse aloud. He has absolutely no impassioned or metrical intonation."

In 1812 Stokes published *A Botanical Materia Medica* in four volumes, which is furnished, like his Withering, with a *catalogue raisonné* of his authorities and full synonymy and references to figures. The work is dedicated to Wright, from whom he received West Indian plants, and who visited him at Chesterfield in July, 1808*; the preface is dated from Chesterfield.

---

[*] *Sertum Anglicum* (1788), p. 27.

[†] See *Journal of Botany*, 1905, pp. 266, 272, 325.

[‡] *Letters of Anna Seward*, iv. 253.

[§] *Ibid.* iii. 229.

[||] iv. 268.

[¶] Vol. v. pp. 150–2.

In this he describes the methods pursued in the descriptions contained in the work, and explains the abbreviation "Obs." which herein, as in the *Commentaries*, continually recurs in the course of the descriptions: "The figures subjoined to botanical observations refer to the numbers of a journal which I have kept ever since I began to investigate plants, my specimens having corresponding numbers affixed to them." This method he recommends to all students. "To these observations," he adds, "I have an index, which, consisting of separate papers arranged in a book, admits of occasional additions without the labour of transcription." There is a fuller description of this in the preface to the *Commentaries* (p. xvii.), whence it would appear that the index anticipated the "card catalogues" now in use. It is described as "moveable, composed of distinct labels, arranged alphabetically."

From the "Abbreviations explained," which occupy pp. xiii.–xlv. of this work, we learn that Stokes's name "was inserted in the prospectus [of Rees's *Encyclopædia*] by a deceased friend without [his] knowledge, but [he] never wrote anything in it": he also notes, in referring to John Thompson's *Botany Displayed* (1798), "The author sent me down the 1st number with my name in the title-page without my having had the least concern with it."†

The extensive series of letters, most of them long and full of interest, extending from 1820 to 1828, preserved in the Winch correspondence at the Linnean Society, bears additional testimony to the perseverance and painstaking accuracy of Stokes. The first—which from its formal beginning seems to mark the commencement of Stokes's share in the correspondence—is dated from Chesterfield, 26 March, 1820, and acknowledges the receipt of Winch's present of the *Essay on the Geographical Distribution of Plants* (1819). From this time until 1825 the letters are numerous: they are occupied mostly with botanical matters, but geology holds a considerable place, while birds, fishes, and insects are occasionally referred to. After the end of 1825 the correspondence seems to have ceased, save for a short letter in 1827 and another in 1828.

---

* *Memoir of Dr. Wright* (1828), pp. 31, 151.

† Of this book, which appears to be rare, there is a copy in the Banksian Library at the British Museum. Its full title is "Botany Displayed; being a complete and compendious Elucidation of Botany, according to the system of Linnæus. By John Thompson. With plates Serving as Examples of the most beautiful, rare, and curious Plants, Indigenous and Exotic; coloured from Nature by A. Nunes, Botanical Painter, No. 13, Robinson's Row, Kingsland, London: Printed for the Publishers, John Thompson and A. Nunes, 1798." It is in quarto and consists of a ten-page introduction and twelve plates, each with two unnumbered pages of letterpress. The introduction refers to Lee and Thornton, and contains four "lessons"; the first giving a table of the Linnean system in Latin and English; the second describing the Vegetable Kingdom under seven heads, *viz.* Algæ, Musci, Fungi, Filices, Palmæ, Gramina, Plantæ; the third giving a glossary based on Milne's Dictionary; the fourth, on leaves, is apparently imperfect. The plates are dated (1 to 3) January 1st, (4 to 7) February 1st, (8 and 9) March 1st, and (10 to 12) April 1st, 1798, so that there seem to have been four monthly parts. They are fairly well drawn and coloured and have some analyses. All represent exotic plants, viz. *Canna flaccida*, *Hæmanthus coccineus*, *Datura arborea*, *Chelone formosa*, *Achania mollis*, *Amaryllis jagus*, *Heliconia Bihai*, *Mesembryanthemum tigrinum*, *Gardenia Thunbergia*, *Cæsalpinia pulcherrima*, and *Amaryllis yuccaides*. The drawings are stated to have been made from David Lewis's nursery at Kingsland, the collection of B. Robertson, Esq., at Stockwell, that of Thomas Sykes at Hackney, Mr. Evans at Stepney, and Malcolm's nursery at Stockwell. The text contains short diagnoses in Latin and English of the species figured, and in English of a good many of their congeners.

In 1830 Stokes published the one volume of his *Botanical Commentaries*. It is an octavo of cxxxiv.–272 pages, without illustrations, and is dedicated "to the memory of W. B. Johnson, M.B., of Coxbeach, near Derby, who died January 13th, 1830, aged 66," of whom he gives further particulars in a note hereafter to be quoted. In this work the marked originality of Stokes's treatment takes a further extension. His earliest works conform to the ordinary use in orthography and punctuation; but in the *Commentaries* he anticipates the present movement in favour of a "reformed spelling," and adopts a comparative disuse of commas. He also discards double letters, as in "quils," and silent terminals, as in "activ," "opposit," "climat." Examples of these and other peculiarities, as in the use of capitals and the abandonment of the apostrophe which usually indicates the possessive case, will be found in the quotations made in the course of this paper.

The preface, which consists of twenty-three pages, is full of interesting matter connected with the need of observation—"every naturalist should rise with the sun"; with horticulture (especially fruit-growing), travel (with special reference to the dangers of Welsh roads), "herbariums" (*sic*), collecting, medicine, gardens, ornithology (of which he seems to have had considerable knowledge), and other subjects. He is greatly impressed with the necessity of precaution against fire; and his remarks on this subject end in an amusing suggestion:—

"Bankss herbarium, if I mistake not, is so constructed that in case of fire it may be readily transported. But our public herbariums should be kept in incombustible buildings, which I fear the British Museum and the house lately occupied by Banks in Soho Square which contains the Linnean herbarium, are not. The Italians less liable to fire than we are build incombustible houses. I cannot help expressing a wish that the proprietors of solitary houses containing collections of books coins statues or paintings should be compelled by act of parliament to hold in readiness the means of extinguishing fires. Chatsworth is well defended by buckets engines and running water within its walls. The engines should be played on the festival of the saint to whom the parish church is dedicated."

The preface also contains Stokes's views on nomenclature, which, he says, had "almost entirely changed" since he wrote the "Advertisement" to the second edition of Withering. In this (1787) he pointed out "the mischief of arbitrarily changing" specific names, but he now follows the line taken by Salisbury in his *Prodromus* (1796), considering that "where a name is susceptible of amendment every botanist should be as ready to suggest a better as to communicate an improved specific character or description," although he does not "approve of altering every name which is not good, considering it better to use the bad one till we discover one which is characteristic." As examples of the changes may be noted *Circæa lutetiana* and *C. alpina*, which he names respectively *C. ovatifolia* and *C. cordifolia*; *Veronica Chamædrys* becomes *V. bibarbata*; *Pinguicula vulgaris* and *P. lusitanica* are changed to *P. ovata* and *P. subæqualis*.

The preface is followed by "an explanation of botanical terms," covering eighty pages, and the notes connected with the definition of each term show by their copious references to books and figures, as well as to plants which illustrate the terms and to his own "observations," the painstaking industry which is manifest in all Stokes's work. The notes are often very full—those on "corolla" and "perispermum" may be cited as examples—and deal incidentally with other than botanical matters. This is succeeded by what is perhaps the most interesting feature of the volume—twenty-one pages of "Abbreviations explained; many of gardens and persons, and titles of books not enumerated in the second edition of the Botanical Arrangement and the Botanical Materia Medica." The information as to "gardens and persons" contains so much matter of interest that copious extracts will follow at the conclusion of this paper. The prefatory matter concludes with a translation of the elder Von Schlechtendal's preface (dated 1812) to the Supplement to Willdenow's *Enumeratio*.

The body of the work consists of very full descriptions of the genera and species of the Linnean classes Monandria and Diandria with Monogynia Triandria; the genera are briefly diagnosed in Latin, with English translation; and the species are similarly characterized; the English descriptions are very full, in accordance with the views expressed by the author in his preface. The treatment of *Crocus* and *Iris* is very elaborate, and should not be overlooked by workers on these genera. The bibliography, both of genera and species, is also very full; the synonymy of the latter includes pre-Linnean nomenclature. The material from which each species is described, whether living or dried, is almost always indicated: from these indications we glean something as to Stokes's peregrinations; he speaks of having gathered wild plants in various localities in Derbyshire, Warwickshire, and Worcestershire, as well as at Cologne, and in gardens in various parts of England, as also at Paris (Trianon), Leyden, Utrecht, and Vienna. His Indian plants are mainly described from Roxburgh's specimens sent him by Wright, who also sent him Jamaican plants from Broughton; other descriptions are based on specimens from Jacquin, Leske, Boehmer, Bartram, Broussonet, L'Héritier, Vahl, and Solander. Other main sources of Stokes's material will be found in the extracts from the *Commentaries* which follow these remarks: Fothergill's garden at Upton was chief among these. The continuation of this work was arrested by the author's death, which took place at Chesterfield, the place of his birth, on April 30th, 1831.

In Edwin Lees's *Botany of Worcestershire* (p. lxxxix. 1867) there is the following anecdote:—

"In the 'Worcestershire Miscellany' (Supplement, 1831) is the following curious note in reference to the death of Dr. Stokes, and a plant recorded by him as growing at Worcester, where he once resided:—'Till the last year (1830) the *Scandix cerefolium* grew as recorded by Dr. Stokes, "in considerable plenty, in the hedge on the south-west side of the Bristol road, just beyond the turnpike." Those Vandals (as respects botanists), the Road Surveyors, last year altered the course of the Bristol road, cut the bank away where the *Scandix* grew, and not even a stray plant is now to be met with there. Coincidences sometimes force themselves upon our notice; had anyone told Dr. Stokes that the removal of the plant he found in "May, 1775," would predicate his own removal from this mortal life, he would surely have smiled. Yet mark, this *Scandix cerefolium* grew unmolested in its habitat, as first remarked by Dr. Stokes, from May, 1775, to May, 1830. In the latter year the road was altered, and the plant eradicated, so that in May, 1831, it could be no longer found in its old home, and *that same month*[*] *and year* was Dr. Stokes gathered to his fathers."' The year previous to his death he published the first volume of a work entitled 'Botanical Commentaries,' the result of fifty years' observations and study. He made extensive collections of plants, which were sold and dispersed after his death."

If Stokes were living in Worcester in 1775 he may have been apprenticed there. In any case it would be interesting to know his relationship to the Jonathan Stokes, florist, who, as will be seen from the following notes, carried on with his son a garden in Worcester, or to the "J. and his daughter Penelope Stokes, florists," who cultivated "Riddgreen garden," the situation of which is not specified. On p. 27 "Mr. Jos. Stokes" is mentioned as having gathered *Olea lancifolia* "as he believes in India, but probably at the cape of Good Hope": "Miss Stokes" gathered *Veronica montana* at Knaresborough (p. 55): Jonathan Rogers Stokes, probably the son of Jonathan,[†] is mentioned (p. 27) as having sent a specimen from a square in Leeds and (p. 143) as having gathered *Salvia nilotica* in the Edinburgh garden. On p. 239 it is mentioned that "Mr. Stokes" gathered *Iris fœtidissima* in a garden in Worcestershire and that "Mrs. Stokes" gathered the same plant in Devonshire.

(To be concluded.)

---

[*] This is not quite accurate, since he died in April.

[†] His second name is his mother's maiden name. He was probably born in 1792 or 1793 (*Letters of Anna Seward*, iii. p. 229); and Stokes had apparently at least three other children (*ibid.* p. 106), one of whom, Honora, Miss Seward's goddaughter, died in 1792 (*ibid.* p. 156).

REPORT OF DEPT. OF BOTANY, BRITISH MUSEUM, 1913.

By A. B. Rendle, D.Sc., F.R.S.

Acquisitions.

(1) *By Donation.*

Additions to the British Herbarium have been received from the following donors:—The Council of the South London Botanical Institute, seeds of 101 species, mainly British; H. C. Baker, Esq., 2 phanerogams; E. J. Bedford, Esq., 4 orchids; C. E. Britton, Esq., 148 phanerogams; C. Bucknall, Esq., 3 species of *Symphytum*; E. M. Day, Esq., 2 phanerogams; G. C. Druce, Esq., 62 phanerogams; Mrs. F. L. Foord-Kelcey, 2 species of *Galium*; Miss G. Lister, 167 mycetozoa; J. E. Little, Esq., 2 phanerogams; Rev. E. S. Marshall, 200 phanerogams; Mrs. Evelyn Northcote, 2 species of *Plantago*; Rev. H. J. Riddelsdell, 152 phanerogams; H. N. Ridley, Esq., C.M.G., 9 phanerogams from Cornwall; Rev. W. M. Rogers, 4 species of Rubi; C. E. Salmon, Esq., 41 phanerogams; W. R. Sherrin, Esq., 3 moss-slides for microscope, 2 mosses, and 5 hepatics; the Watson Botanical Exchange Club, 71 phanerogams.

The following donations have been made to the General Herbarium:—

Europe.—Miss L. S. Gibbs, 24 phanerogams and 2 ferns from Iceland; H. F. A. Mallock, Esq., F.R.S., diatom-material (*Gomphonema capitatum*) from South of Spain; Hon. N. C. Rothschild, 7 phanerogams, chiefly from Hungary; C. E. Salmon, Esq., 4 phanerogams; W. R. Sherrin, Esq., 3 alpine mosses; H. S. Thompson, Esq., 2 phanerogams from South of France; Major A. H. Wolley-Dod, 20 Gibraltar plants.

Asia.—Prof. F. O. Bower, specimens of a new species of fern from Darjeeling (*Matteuccia*); S. T. Dunn, Esq., fruits of *Derris parviflora* from Ceylon; Miss L. S. Gibbs, 304 phanerogams and 128 cryptogams from British North Borneo; Sir E. G. Loder, cones of *Pinus pumila* from S. Yakutsk in Siberia; Dr. E. D. Merrill, 9 photographs of Philippine *Rubiaceæ*; the Director of the Imperial Botanic Gardens, St. Petersburg, 2 new species from E. Asia; J. N. Sheffield, Esq., 10 ferns, 24 mosses, 24 hepatics, and 10 lichens from Perak; and 1 fungus from C. G. Lloyd, Esq.

Africa.—Mrs. W. E. Balston, 113 phanerogams from vicinity of Cape Town; Lieut. G. St. J. Orde Browne, 32 phanerogams from Kenya Province, Brit. E. Africa; R. H. Bunting, Esq., 50 phanerogams from Liberia; Col. F. A. Chaves, sample of Cooron-gite containing diatoms from Lake Furnas, Azores; T. F. Chipp, Esq., 52 phanerogams and 2 ferns from the Gold Coast; Dr. D. T. MacDougal, 195 phanerogams and 6 cryptogams from Egypt and Red Sea Province; R. E. Massey, Esq., 150 flowering plants from the Soudan; C. F. H. Monro, Esq., 452 phanerogams and 6 ferns from Rhodesia; Hon. W. Rothschild, 23 phanerogams and 1 fern from N.W. Algeria and 8 enlarged photographs of trees in the Public Gardens, Algiers; the Percy Sladen Trustees, 22 plants collected in S.W. Africa by Prof. H. H. W. Pearson; Mr. and Mrs. P. Amaury Talbot, 738 phanerogams and 3 ferns from the Eket District, South Nigeria.

Australasia.—Miss B. de Pledge, specimen of *Verticordia Forrestiana* from Western Australia.

Oceania.—Miss L. S. Gibbs, 8 phanerogams and 3 ferns from Hawaii.

America.—Mr. R. Heber Howe, Junr., 24 Lichenes Novæ Angliæ; Prof. H. Lecomte, 3 *Rubiaceæ* from Tropical America; Rev. A. Miles Moss, 35 Brazilian plants; T. A. Sprague, Esq., 21 *Rubiaceæ* from Venezuela; the Director, University Botanic Garden, Pennsylvania, 26 North American *Scrophularineæ.*

General.—Miss G. Lister, 340 exotic mycetozoa.

Cultivated Plants.—W. E. Balston, Esq., 3 orchids; R. H. Beamish, Esq., inflorescence of *Furcræa* and 3 other plants; E. A. Bowles, Esq., 2 phanerogams; Sir Trevor Lawrence, Bart., 10 orchids; J. O'Brien, Esq., 2 orchids; D. M. Moss, Esq., some abnormally developed pears; Hon. N. C. Rothschild, 29 orchids.

(2) *By Purchase.*

British Isles.—Botanical Exchange Club, 108 phanerogams; Rev. E. F. Linton, 17 specimens of British willows; C. E. Hartley Smith, 10 specimens of prepared British fungi. Special mention should be made of the Moss-Herbarium of Dr. R. Braithwaite, estimated to contain 5300 specimens, representing 600 species, the types of his British 'Moss-Flora' (1880–1905).

Europe.—Through Dulau & Co.—O. Jaap, 50 fungi selecti, ser. xxv., xxvi., and 20 myxomycetes, ser. vii.; J. E. Kabát and Bubák, 50 fungi imperfecti, fasc. xv.; K. W. Krieger, 50 fungi Saxonici, fasc. xlv.; A. Paulin, Flora exsiccata Carniolica, cent. ix., x.; D. Saccardo, 169 fungi, Mycotheca Italica, cent. xvii., xviii., part i.; J. Schiller, H. Cammerlohe, and G. Seefeldner, 30 Algæ Adriaticæ, cent. i., fasc. 2; H. and P. Sydow, 50 fungi, Mycotheca Germanica, fasc. xxiv.; A. Toepffer, 50 specimens, Salicetum exsiccatum, fasc. viii.; T. Vestergren, 150 micromycetes rariores selecti, fasc. lxiii.–lxviii.

Through R. Friedländer & Sohn.—M. Britzelmayr, 144 lichenes Bavariæ exsiccati, with figures.

Through T. O. Weigel.—V. F. Brotherus, 100 mosses, Bryotheca Fennica, fasc. iii.; A. Fiori et A. Béguinot, Flora Italica exsiccata, cent. xvii., xviii.; A. von Hayek, 50 specimens, Centaureæ exsiccatæ criticæ, fasc. i.; F. Petrak, 100 specimens, Flora Bohemiæ et Moraviæ exsiccata, lief. xii.

From the Publishers.—H. Sudre, Batotheca Europæa, fasc. xi., 50 specimens, and Herbarium Hieraciorum, fasc. iii., 50 specimens.

Asia.—S. T. Dunn, 40 Chinese plants collected by E. E. Maire; W. Siehe, 250 rare Oriental plants (selected).

Africa.—E. Chiovenda, Flora della Colonia Eritrea, cent. i., ii., prepared by A. Pappi; E. Gilg, 290 phanerogams and 10 vascular cryptogams from Cameroons, collected by G. Zenker; E. M. Reineck, 312 Algerian plants collected by A. Faure, and 276 plants collected in Morocco and Tunis by C. J. Pitard; Rev. F. A.

Rogers, 120 phanerogams from Rhodesia and Congo District; T. O. Weigel, 25 fungi, Mycotheca Boreali-Africana, fasc. iv., prepared by R. Maire; F. Wilms, 399 phanerogams and 69 cryptogams collected in Natal by H. Rudatis, and 93 phanerogams collected in Uganda by G. Scheffler.

America.—E. Bartholomew, 500 fungi Columbiani, cent. xxxviii.–xlii., and 300 North American Uredineales, cent. vi.–viii.; E. W. Berger, exhibition specimens and photographs of parasitic fungi on scale insects; T. S. Brandegee, 302 phanerogams and 30 ferns collected in Mexico by C. A. Purpus; W. E. Broadway, 273 phanerogams and 27 cryptogams from Tobago; O. Buchtien, 147 phanerogams and 53 vascular cryptogams from Bolivia; Collins, Holden, & Setchell, 50 algæ, Phycotheca Boreali-Americana, fasc. xxxviii. (per Dulau & Co.); E. Hassler, 402 phanerogams and 11 cryptogams from Paraguay; C. C. Haynes, 20 American hepaticæ, decades xi., xii.; E. M. Reineck, 10 selected species of mosses, mostly from Central America; H. von Türckheim, 226 phanerogams and 15 vascular cryptogams from Guatemala (per T. O. Weigel); I. Urban, 633 phanerogams and 142 cryptogams collected in St. Domingo by M. Fuertes.

General.—Through Dulau & Co.—H. Rehm, 118 Fungi, Ascomycetes exsiccati, fasc. lii., liii.; H. Sydow, 150 Fungi exotici exsiccati, fasc. ii.–iv.; P. Sydow, 50 *Uredineæ*, fasc. li., 25 *Ustilagineæ*, fasc. xii., and 25 Phycomycetes and Protomycetes.

Through V. Schroeder.—101 ferns, mostly tropical, determined by E. Rosenstock.

(3) *By Exchange of Duplicates.*

Oakes Ames, 102 orchids from the Philippine Islands; Director, Hungarian National Museum, Budapest, Flora Hungarica exsiccata, cent. i.; Prof. K. Domin, 100 phanerogams from Montenegro; Director, Royal Gardens, Kew, 11 plants from Keeling Island; Botanist, Bureau of Science, Manila, 1779 phanerogams and 868 cryptogams, mainly from the Philippine Islands; Director, Botanical Garden, New York, 625 phanerogams and 31 cryptogams from Bermuda, Cuba, and Jamaica; Department of Botany, Riksmuseet, Stockholm, 159 Brazilian Grasses; Director, National Herbarium, Sydney, 48 Australian plants; Curator, Botanical Department, Hofmuseum, Vienna, 100 Kryptogamæ exsiccatæ, cent. xxi., mostly European; Director, Botanic Garden and Institute of the University, Vienna, 400 plants, Flora exsiccata Austro-Hungarica, cent. xxxvi.–xl.; Curator, U.S. National Herbarium, Washington, 141 West Indian Grasses; Director, Botanic Gardens, Zürich, 3 plants from Cameroons.

(4) *Departmental Library.*

A collection of 11,325 plates and original drawings formed by Isaac Swainson in the eighteenth century was presented by H. S. Cowper, Esq.; a series of pencil sketches principally of pollen grains, with MS. notes and observations by the late Francis Buckell, was presented by his son Edward Buckell, Esq.

SHORT NOTES.

Habenaria montana Dur. & Schinz = H. chloroleuca Ridley in Caithness.—Mr. G. Lillie has sent me a fine specimen of this orchis gathered from a bank near Loch Watenton on the east coast. The specimen is remarkable in that it has only one tuber, and that globular—it may be the two ordinary ones have coalesced? Mr. Rolfe, to whom I sent flowers and half the tuber, remarks:—"The globular bulb is, so far as I can see, quite unusual in *Habenaria chlorantha*, so that I shall keep it with the flowers. I do not yet see the signification of the variation, but will look at it again." Many years ago Dr. Ward told me he had gathered the plant in Strath Halladale, near the bridge, not far from the Reay Burn. But there must be some confusion of boundary here, as the source of the Reay Burn is quite two miles inside the Caithness border. So it may be he actually gathered it in Caithness. In Scotland it is recorded for East and West Sutherland and the Outer Hebrides. In Norway it extends up to 63° 15′ N. lat. (Blytt); in Sweden to Östersunds lâu. In South Finland it occurs only in the provinces of Abo and Alaud; while *H. bifolia* reaches 67° N. lat. (Hjelt) in Norway to 70° 20′ (Norman), and in Sweden up to Swedish Lapland (Berlin).—Arthur Bennett.

Linaria arenaria DC. in N. Devon (p. 276).—I am unable to account for the presence of this plant at Santon, Braunton, three specimens of which have been brought to me from that place by different persons during this autumn. I can state, however, that the sower of the seeds of the plants on Northam Barrows has not sown any elsewhere. I do not feel the difficulty experienced by Mr. Hanbury in believing that the wind may have been the agent by which seeds were conveyed to the habitat at Santon from that at Northam, distant a little over five miles S.S.W. No one who has had experience of the furious gales occasionally visiting these burrows could, I think, doubt that heavier objects than seeds could be transported by them between the two localities. I do not, however, feel much confidence in thus accounting for the existence of the plants at Santon, but think it more probable that the seeds here also may have been sown by human hands. Of one thing I feel sure—that the plant is of recent introduction. I have during the last forty years been a constant visitor to the part of Santon where the plants are found, and I could not have passed them over if they had been there before the present year.—Thos. Wainwright.

Carum verticillatum Koch in Dorset.—This umbellifer grows plentifully in a rough marshy meadow on the border of Slape Heath, between Stoborough and Arne, where it was pointed out to me in July last by the discoverer, Mr. T. H. Green, of Weston, Bath. The whole extent of the plant's area is rather more than an acre. It may be thought remarkable that this species should have hitherto escaped observation in a district so thoroughly worked and so frequently visited by botanists from all parts of the country; and in that sense it was a very unlikely find. But as, according to Hooker and Syme, the plant may be looked for in meadows of the western counties from Argyle southwards, this new station should, I think, be accepted as natural and satisfactory.—JAS. W. WHITE.

VACCINIUM OXYCOCCOS IN SOMERSET (p. 277).—The Cranberry is not new for this county, though very scarce; in *Topographical Botany* it is duly recorded for both vice-counties. It still grew near Shapwick (v.-c. 6) in 1906!; and Sir W. C. Trevelyan found it, long ago, on the Brendon Hills (v.-c. 5). The Exmoor station, however, is certainly a fresh one.—EDWARD S. MARSHALL.

IT seems only right to say that before writing the note on *Vaccinium Oxycoccos* I consulted the index to the *Flora of Somerset*, in which the plant does not occur; it appears in the addenda. It is, however, in Mr. White's *Flora of Bristol*, to which I should have referred, and there are various scattered records. Dr. Moss writes that Miss Saunders's record is the most southerly station for the plant, and indicates its probable occurrence in Devon and Cornwall.—JAMES BRITTEN.

ORCHIS HIRCINA IN SUSSEX.—During the past summer three specimens of *Orchis hircina* have occurred in Sussex. I am informed that two specimens in bloom were found amongst collections of wild flowers which had been brought into the annual exhibition held during the season at the Brighton Museum. Unfortunately, the persons who brought them and the localities are unknown. The third specimen occurred in the Ouse district near Lewes, and was dug up by the finder. I did not hear of the find until late in the season, but managed to see the specimen after the flowering period while the seed vessels still hung on the stem. A note of the first specimen which I found in East Sussex is in Journ. Bot. 1911, 276.—E. J. BEDFORD.

REVIEW.

An Introduction to the Study of Plants. By F. E. FRITSCH & E. J. SALISBURY. 8vo, pp. 397; 8 plates, 222 text-figures. Bell & Son. 1914. 4*s.* 6*d.* net.

A new introduction to the study of botany would appear uncalled for if one had regard only to the number of elementary books on the market. Most of these, however, fail to a greater or lesser extent, and none can be considered wholly satisfactory. The present book is welcome in that it fully justifies its title, and can be thoroughly recommended to those about to study the life of plants, no matter what their future aims may be. There are twenty-eight chapters. The plant is first considered as a whole, and then the various vegetative organs are treated. Several chapters are devoted to physiology, then follow chapters on the inflorescence and the phenomena of pollination. Separate chapters are concerned with the soil, the commoner families of flowering plants, and the different forms of plant life. Four chapters are apportioned to ecology. An appendix gives certain supplementary suggestions as to the carrying out of some of the physiological experiments. There is an exceedingly copious index (27 pages) which should prove invaluable to students. The book is well illustrated, and all the illustrations are original. The photographs are excellent, but are reproduced on a rather too coarse screen. A few of the figures are a little crude, but the authors deserve thanks for not vainly repeating time-honoured drawings. Many new physiological experiments are described, and some of the older ones have been more or less altered. A chapter on soil is as welcome as it is rare in an elementary book. The account of ecological types—woodlands, heath and moorland, marsh- and water-floras, and the seashore—is perhaps a little too condensed to be easy reading. The chapter on classification fails, as in the case of all modern English text-books, to give students any idea of the *principles* of plant classification. There is too much of the plant dictionary in our books, a kind of glorified floral formula with a list of exceptions generally sufficing for the description of a family. When students are as carefully and intelligently introduced to the principles of plant classification as they are to those of other branches of botany, the real importance of systematics will begin to be more clearly understood by professional botanists as a whole. The present book is cheap, well bound and printed, though the paper is very shiny. The authors have produced a work which will be very much used by those working for the Matriculation examinations at the different universities.

J. R.

BOOK-NOTES, NEWS, &c.

Bryologists throughout the world will be grieved to hear of the calamity that has befallen M. Jules Cardot, of Charleville, through the war. Charleville, which is a suburb of Mezières, was entered by the Germans on the 26th of August. On the previous night every inhabitant received sudden orders to leave at once, a battle being imminent. M. Cardot, his wife and daughter-in-law were thus compelled to leave all they had, taking with them but the clothes they wore and what little money was ready to hand. Everything else was abandoned to the Germans, household goods, family possessions, library, collections, instruments; and he and his family are now taking refuge in the house of a friend at Dinard in Brittany. To add to the calamity, M. Cardot's income was almost entirely derived from real property in Charleville, in all probability by now reduced to ruins. At the outbreak of the war M. Cardot had just completed an important work on the Moss-flora of Madagascar, which had been occupying him for many months past. Among the best known of his published works are his valuable essay on the Leucobryaceæ, his comprehensive work on Antarctic Bryology, a preliminary Moss-flora of Mexico, a Monograph of the Fontinalaceæ, a treatise on the Sphagna of Europe, besides innumerable minor publications.

The Journal of the Linnean Society (Botany), xlii. no. 237 (Oct. 8), contains a Flora of the island of Shikotan, by Hisayoshi Takeda, and a long paper on the Evolution of the Inflorescence by Mr. John Parkin.

NEW RUBIACEÆ FROM TROPICAL AMERICA.—V.

By H. F. Wernham, D.Sc., F.L.S.
(Department of Botany, British Museum.)

(Continued from p. 227.)

The present paper is confined to species of the large genus *Psychotria*, and its immediate ally *Cephaëlis*, so abundantly represented in Tropical America. The types of all are, as indicated in each case, in either the National Herbarium or that at Kew, or both; to the respective authorities of which I am indebted for the necessary facilities for examination of the specimens.

Cephaelis thibaudiæfolia Wernham, sp. nov. Frutex biorgyalis, ramulis validis novellis plus minus glandulose puberulis; *foliis* crassis margine revolutis, ovatis v. lanceolatis, 4·5–7·5 cm. × 1·4–2·4 cm., acuminatissimis apice acutissimis, basi brevissime acuminatis v. subrotundatis, supra glaberrimis nitentibus, subtus in vena centrali nonnunquam obscure puberulis nonnunquam glabris, venis secundariis utrinque 6–7 obscuriusculis v. subtus prominulis, petiolo minute glandulari-puberulo ad 8 mm. longo, *stipulis* in vaginam brevem oblongam connatis aristis 2 brevibus distantibus. *Flores* inter minimos in capitulis involucratis ad 1·4 cm. diam. dispositis, pedunculis graciliusculis ad 4·5 cm. longis puberulis, *bracteis* exterioribus linearibus v. lineari-lanceolatis ad 8 mm. longis. *Bacca* sulcata pisiformi glaberrima.

Guiana: *Hostmann*, 801! Potaro River, Kaieteur Savannah, *Jenman*, 867! Hbb. Mus. Brit. and Kew.

Readily recognized by the thick, acuminate leaves, recalling, save in their small size, those so common in the *Thibaudia* group of *Vacciniaceæ*.

Cephaelis Jenmanii Wernham, sp. nov. Glaber, *foliis* elliptico-oblanceolatis, ± 17 cm. × 7 cm., brevissime acuminatis obtusis, basi acutis, petiolo graciliusculo ad 2·5 cm. longo, utrinque glabris, venis secundariis plurimis approximatis utrinque prominulis, *stipulis* late oblongis ± 1 cm. longis apice bifidis vaginantibus. *Floribus* in capitulis pro genere parvis compositis plerumque 3, pedunculis primario 3 cm. v. longiore lateralibus ± 1 cm., sulcatis validiusculis, *bracteis* involucellorum late ovatis ca. 4 mm. × 4 mm. minute ciliatis, bracteis primariis 2 lanceolatis acutis concaveis 6 mm. longis; *calyce* minute dentato v. subintegro; *corolla* crassa tubo gracili 1·3 cm. longo, lobis vix 2 mm. longis revolutis.

Guiana: Potaro River, Sheenabowa; fl. Sept.–Oct., *Jenman*, 1291! Hb. Kew.

Near the Bolivian *C. conephoroides* Rusby; distinct in the divided stipules and slender, longer corolla.

Cephaelis kaieteurensis Wernham, sp. nov. Glaber, ramulis gracilibus, *foliis* oblongo-oblanceolatis 10–15 cm. × 3–4 cm., caudato-acuminatis utrinque acutis glaberrimis, petiolo tenui ad 2 cm. longo, venis secundariis plurimis approximatis vix prominulis, *stipulis* oblongis vaginantibus diutius persistentibus 3–3·5 mm. longis apice acutissime bifidis. *Floribus* in capitulis

sæpius 3, 5–8 mm. diam., pedunculo communi gracili 3–4 cm. longo, pedunculis secundariis validiusculis ca. 1 cm. longis, *bracteis* 2 primariis lanceolatis ± 1·2 cm. longis, involucellorum bracteis ovatis ca. 3 mm. × 2 mm. acutis; *calyce* minusculo subintegro; *corolla* gracili tubo 9 mm. longo, limbo ± 5 mm. diametro reflexo.

Guiana: Demerara, Kaieteur Falls, *Appun*! Hb. Mus. Brit.

Allied to the previous species, but of much more slender habit, thinner and narrower leaves, smaller heads, &c.

Psychotria transiens Wernham, sp. nov. Glaber, ramulis valde complanatis nodis tumidis; *foliis* coriaceis, ellipticis ± 6·5 cm. × 2·3 cm., brevissime acuminatis subacutis, basi sæpe subobtusis, brevissime petiolatis, utrinque glaberrimis supra nitentibus, reticulo præsertim subtus prominulo e quo venis lateralibus sæpe nec bene definitis, *stipulis* late oblongis brevissimis breviterque acutissime 2-aristatis. *Floribus* in capitulis trifidis paucifloris dispositis, pedunculis primariis 4·5 cm. vel longioribus, secundariis 1·2 cm., lævissimis striatis validiusculis, *bracteis* 2 primariis lanceolatis acutis ± 3·5 mm. longis carnosiusculis concaveis plus minus connatis intus minute pilosis, involucelli bracteis ovatis acuminatis paucis ± 4 mm. × 3 mm.; *calycibus* mox ex involucello exsertis campanulatis dentibus late triangularibus subacutis brevibus; *corolla* extus glaberrima ca. ad medium in lobos oblongos 5 obtusos divisa, tubo ± 4 mm. longo insuper vix ampliato. *Bacca* ellipsoidea ca. 1·4 cm. × 9 mm. a calyce tubulari persistente 3–4 mm. alto coronata.

Guiana: Roraima, upper slope, and "our path," *Im Thurn*, 191! 214! Hbb. Mus. Brit. and Kew.

Clearly allied to *Cephaëlis Jenmanii* and *C. kaieteurensis* just described. These species, the present one and the allied *C. conephoroides* Rusby, lie on the border-line between *Psychotria* and *Cephaëlis*. The next two have the same affinity, but belong more decidedly to the genus *Psychotria*.

Psychotria hemicephaelis Wernham, sp. nov. Frutex glaberrimus, ramulis gracilibus; *foliis* crassiuscule coriaceis ellipticis, 5–8·5 cm. × 1·5–3 cm., utrinque leniter angustatis basi in petiolum brevissimum v. obsoletum, apice acutis, venis secundariis multis approximatis, *stipulis* ovatis parvis subintegris v. apice breviter bifidis. *Floribus* glaberrimis in capitulis involucratis post anthesin in umbellis compositis laxescentibus, pedunculo ca. 3 cm. longo, *bracteis* ellipticis exterioribus ca. 1·8 cm. × 8 mm. interioribus minoribus; *calyce* minuto subcarnoso limbo dentato; *corolla* gracillima 9 mm. longa, lobis 5 vix 1 mm. longis obtusissimis. *Bacca* parva ellipsoidea glabrata costata a calyce persistente parum accrescente coronata.

Guiana: Potaro River, Kaieteur Savannah; fl. and fr., Sept.–Oct., *Jenman*, 1223! Hb. Kew.

Related to *P. oblita*, next to be described; readily distinguished by the smaller and more slender corolla, and the more compact head, as well as by the larger and relatively narrower leaves.

Psychotria oblita Wernham, sp. nov. Glaberrimus, ramulis angulato-compressis; *foliis* crassiusculis ellipticis, 4·5–8·5 cm.

× 1·5–3·4 cm., utrinque leniter angustatis apice obtusis, petiolo vix 5 mm. longo, utrinque glaberrimis, venis secundariis utrinque ca. 5–9 supra obscuriusculis subtus prominulis, *stipulis* brevissime vaginantibus vel sæpius obscuris 2-denticulatis. *Floribus* in cymis subcapitatis paucifloris ca. 2·5 cm. × 1·5 cm., *bracteis* conspicuis lanceolatis ± 1·4 cm. × 3 mm.; *calyce* minimo dentibus lanceolatis; *corolla* pro genere inter maximas tubo subcylindrico 1·8 cm. longo insuper parum ampliato, lobis suberectis lanceolatis ca. 4 mm. longis obtusissimis.

Guiana: Roraima, *Appun*, 1103! *Schomburgk*, 1018 B! Upper slope, *Im Thurn*, 185! Hbb. Mus. Brit. and Kew.

The affinity is with *P. lupulina* Benth., but the leaves of our species are much smaller and tougher, the bracts much narrower, &c.

Psychotria pseudinundata Wernham, sp. nov. Glaber, ramulis virgatis teretibus lævissimis; *foliis* subcoriaceis lanceolatis 6–9 cm. × 1·5–2·3 cm., acuminatissimis acutissimis, basi acutis brevissime petiolatis vel subsessilibus, utrinque glaberrimis nitentibus, venis secundariis tenuissimis subtus tamen conspicuis utrinque ca. 9, *stipulis* fere ad basin in aristas 2 setaceas ad 1 cm. v. longiores divisis. *Floribus* in cymas subcorymbosas dispositis, pedunculis lateralibus ad 1·8 cm. longis, *bracteis* primariis 2 lineari-lanceolatis ca. 8 mm. longis acutissimis, secundariis pro rata latioribus necnon minoribus; *calyce* minuto denticulato; *corollæ* tubo gracili insuper parum ampliato ca. 5 mm. longo extus glabro intus densissime barbato, lobis angustis obtusis 3–4 mm. longis; *staminibus* inclusis.

Guiana: Cayenne, Hb. *Sagot*, 1299! (Collected by Melinon.) Hb. Kew.

This specimen superficially resembles *P. inundata* Bth.; in the latter, however, the corolla-lobes are relatively much shorter and the anthers far exserted.

Psychotria boqueronensis Wernham, sp. nov. Ramosus, glaber, ramulis virgatis gracilibus teretibus; *foliis* coriaceis crassiusculis, obovatis ad ellipticis, 2·5–6·0 cm. × 1·3–2·7 cm., brevissime plerumque acuminatis acutis, basi subcuneato-acutis, brevissime petiolatis, utrinque glaberrimis, venis supra nisi centrali prominente obscuriusculis subtus secundariis utrinque ca. 9 prominulis, *stipulis* brevibus late oblongis breviter 2–3-aristatis, quorum parte persistente inferiore indurata. *Inflorescentia* subspicata, ± 2–2·5 cm. longa, pedunculo 3–3·5 cm. longo, graciliusculo glabro; *bracteis* setaceo-lanceolatis acuminatissimis acutissimis, vix 3 mm. excedentibus; *floribus* subsessilibus, glabris; *calyce* late campanulato, dentibus 5 brevibus triangularibus, acutis; *corolla* latiuscule cylindrica, 5–6 mm. longa, lobis lanceolatis tardius reflexis. *Bacca* pisiformi, ± 5 mm. diam., costata, glaberrima.

Colombia: Bogota, El Boqueron, 8775 ft. *Triana*, 1684! Hbb. Mus. Brit. and Kew; *Triana*, 80! Hb. Mus. Brit.

Distinct principally in the subspicate inflorescence, and the bright yellow colour assumed by the leaves when dried. This species has, apparently, some affinity with *Mapouria panurensis*

Müll. Arg.; from which it is readily separated by the much smaller leaves, and smaller, more slender, inflorescence.

Psychotria Everardii Wernham, sp. nov. Ramulis lignosis nodosis glabris; *foliis* crassiusculis, ellipticis, 4–7·5 cm. × 1·7–3·5 cm., vix acuminatis obtusis v. subacutis, petiolo brevissimo, utrinque glaberrimis, venis supra prominulis subtus prominentibus, secundariis utrinque ca. 8, *stipulis* caducissimis parvis rotundatis. *Inflorescentia* subcorymbosa multiflora, ± 2·5 cm. × 2·3 cm., pedunculo 1–2 cm. longo ut ramuli minute puberulo; *bracteis* obsoletis; *calyce* minuto denticulato; *corolla* subcylindrica, insuper parum ampliata, tubo ± 6 mm. longo extus minutissime pubescente, lobis ovato-lanceolatis acutis acuminatis, ca. 2·5 mm. longis, patentibus.

Guiana: Roraima, path to Upper Savannah. Fl. 16 Dec. *Im Thurn*, 291! Hbb. Mus. Brit. and Kew.

Related to *P. concinna* Oliv., of the same locality, but readily distinguished by the much larger and differently shaped leaves, the many-flowered inflorescence, &c.

Psychotria plocamipes Wernham, sp. nov. Glaber, ramulis complanatis striatis lævibus; *foliis* oblongo-lanceolatis leniter acuminatis subacutis basi subrotundatis 8–10 cm. × 1·7–3·2 cm., petiolo ad ± 8 mm., utrinque glaberrimis, venis secundariis utrinque ca. 8, aliis plus minus conspicuis intervenientibus, *stipulis* parvis breviuscule setaceo-aristatis. *Floribus* inter minimos, 3 mm. longis, in cymis paniculatis laxis ± 3·5 cm. × 1·5 cm., pedunculo nutante gracillimo ad 9 cm. v. longiore, ramulis lateralibus pedunculi apicem versus incurvatis; *calyce* minuto plus minus irregulariter dentato; *corolla* infundibulari-cylindrica tubo vix 2·3 mm. longo lobos oblongos obtusos subæquante; *antheris* in filamentis versatilibus omnino exsertis.

British Guiana: *Schomburgk*, s.n.! Hb. Kew.

Recognizable by the very long slender peduncles and minute flowers. The affinity is with *P. breviflora* Müll. Arg., but the two species are readily separable from the description.

Psychotria astrellantha Wernham, sp. nov. Glaber, ramulis subteretibus; *foliis* papyraceis elliptico-lanceolatis 11–16 cm. × 3·5–5·3 cm., utrinque angustatis acutis, utrinque glabris, venis secundariis prominulis utrinque ± 8, petiolo ± 1 cm. longo, *stipulis* latissime ovatis integris ca. 4 mm. × 5 mm. *Floribus* inter minimos vix 2·5 mm. longis, in umbellis terminalibus cymosis sæpius quinqueradiatis, pedunculo primario ca. 5 mm. longo, radiorum pedunculis ± 1 cm. longis; *calyce* minuto limbo obscuriuscule sinuato-dentato; *corolla* infundibulari extus glabro, tubo vix 1·5 mm. longo, lobis patentibus oblongo-triangularibus obtusis limbum subæquantibus; antheris nec longe omnino tamen exsertis.

Guiana: Potaro River, below the Kaieteur. Fl. Sept.–Oct. *Jenman*, 959! Hb. Kew.

Probably allied to my previous species, but separable at once by the short erect peduncle and umbellate inflorescence.

(To be continued.)

JONATHAN STOKES AND HIS *COMMENTARIES.*

By James Britten, F.L.S., and G. S. Boulger, F.L.S.

(Concluded from p. 306.)

The following extracts from the "Abbreviations explained" (pp. cx–cxxxiv) contain all the matter which appears to be of interest: the mere titles of books are not included. Stokes's spelling and punctuation have been preserved throughout: a few explanatory notes and cross-references have been added in square brackets. It has not been thought necessary to give the page of the *Commentaries* for each reference.

Bakewell bath garden cultivated by Mr. Watson, author of Strata of Derbyshire, 4to, and [White Watson, fl. 1773–1831, F.L.S. 1800] of Matlock, 4to.

Baker, Mr. T. rector of Whitburn, near Sunderland in Durham. The specimens given and lent to which his name is subjoined were collected in a tour through France Switzerland and Italy to Poestum. [He also gathered plants in Oxford garden (p. 134); many letters from him are in Winch's correspondence at the Linnean Society.]

[*Ballard*—see *Robinson's street garden.*]

Banks (b. 1748, d. 1820). Why have we not a life of this patron of natural history. Why are not the plates he engraved and their descriptions by his librarians given to the world at the expence of a society of subscribers, who may perform for natural science what the Dilettanti society has done for the illustration of ancient art. The descriptions should be published in 8vo. The plates are in largish folio. L'Heritiers to the best of my recollection are engraved on the model of them. [See Journ. Bot. 1905, 287, for an account of these plates.]

Bath garden on oolitic limestone or lias, cultivated by Sole [William Sole (1741–1802)], apothecary and author of Menthae britannicae, who travelld every year over some part of the island in pursuit of indigenous plants.

Bautry garden in Nottinghamshire, cultivated by Dowager Lady Galway [printed Bawtry on p. 15.]

Belmont garden in Staffordshire, the seat of J. Sneyd. See Soho garden and Bot. arr. ed. iv. i. p. xiv. On gritstone.

Blymhill garden in Staffordshire, between Penkridge and Newport, on sand and gravel, cultivated by the amiable rector Dickenson who travelling in France with C. Darwin the author of experiments on Pus, brought home many of the aromatic plants of Montpelier from Gouan. [Samuel Dickenson travelled as tutor with Charles Darwin (1758–1778), uncle of the author of *The Origin of Species*, in 1766–7. *Life and Letters of C. Darwin*, i, 7.]

Bosworth garden, in Leicestershire, cultivated by Dr. Power [John Power M.D. fl. 1778–1811, whose herbarium is now in the possession of the Holmesdale Natural History Society], removed to Lichfield.

Boraston, Mr. Gregory, clergyman in the diocese of Worcester, collected plants in Italy and Gibraltar. [pp. 23, 27.]

Bromehouse garden between Chesterfield and Dronfield on gritstone, cultivated by Miss Bromehead an investigator and collector of plants.

Camd. by Gough. The greater number of the places of growth of plants supplied by Mr. E. Forster jun. *Turn. and Dillw.* i. 332. When will our antiquaries get rid of their passion for folios and quartos, and print in portable volumes which may accompany a traveller. If reprinted in fol. the editor will do well to consider the convenience of the reader who consults the index, by following Gibson in paging the columns.

Chapel Allerton garden near Leeds, cultivated by R. Salisbury, probably removed to near London. [Salisbury did, no doubt, remove many plants to Mill Hill, the garden made by Peter Collinson which he occupied from 1802 till his removal to Queen Street, Edgware Road, about 1809. At this last residence he could only cultivate some hundreds of pot plants.]

Clapham garden cultivated by Mr Bewick, I think a merchant of London.

Clifton garden near Bristol hot wells, on redland limestone, cultivated by Lady de Clifford.

Codnor garden near Alfreton in Derbyshire, on gritstone, cultivated by the late Miss Wood, a most zealous cultivator of hardy plants, the whole surface of whose garden was coverd with curious plants contiguous as in a state of nature and struggling for preeminence or life. Her art of gardening consisted in extirpating weeds and preventing one plant from destroying its neighbours.

Crome garden near Upton in Worcestershire on blue lias, cultivated by G. W. Coventry Earl of Coventry and his gardener Graeffer afterwards partner with Gordon of Mile end nursery and at length gardener to the King of Naples.

[*Curtis.* See *Lambeth garden.*]

Darley garden on gritstone in the valley of the Darwent between Bakewell and Matlock in Derbyshire. The collection was formed by T. Knowlton the celebrated gardener of the last century and cultivated by him and his grandson the present owner at Lonsborough in the E. riding of Yorkshire, whence it was removed to Edensor in Derbyshire and finally to Darley [p. 91]. [Thomas Knowlton senior (1692–1782) had been gardener to Sherard. Thomas Knowlton junior (1757–1837) was elected F.L.S. 1795. The latter had a herbarium (p. 110).]

Dav. Daviess welsh botanology, 1813. 8vo. The first part is a flora of Anglesey and the second in Welsh an alphabetic list of the Welsh names of vegetables. The author was rector of Aber in Caernarvonshire but resided at Beaumaris in Anglesey, where I botanised with him for 3 or 4 weeks, looking through his herbarium. He gave me duplicates of the rarer phenogamous plants. I hope his heirs have attended to my exhortations to keep it in a room where there is a constant fire, for Anglesey is a flat island overrun with Iris Pseudacorus. The plants were very much eaten by the brown Dermestes though kept in a closet adjoining to a sitting room upstairs in which there was a constant fire. [Rev. Hugh Davies (1739?–1821), F.L.S. 1790, M.A. Oxon. 1763, Rector of Aber, 1787, was also the friend of Hudson.]

Donn by Lindl. Hortus cantabrigiensis, ed. 11th, 1826. 12mo. The editor informs us that after the 4th or 5th edit. the author enlarged it by adding the names of all the ornamental plants known to be cultivated in the British gardens. The 5th edit. given me by Davies of Trin. coll. incapable of countenancing a fraud, I regard as the catalogue of the Cambridge garden. [James Donn (1758–1813) was under Aiton at Kew and became Curator at Cambridge in 1796, the first edition of his *Hortus* being published in the same year.]

[*Dickenson.* See *Blymhill garden.*]

Edinburgh garden on basalt, cultivated by Hope. Wright sent me a large collection of grasses gatherd in the garden since the death of Hope. The names are not in Wrights handwriting.

Ewell grange garden near Bromsgrove in Worcestershire, on red ground, cultivated by the late Earl of Plymouth.

Foth. cat. A catalogue of the collection of hot house and green-house plants late the property of J. Fothergill M.D. which will be sold by auction 20 Aug. 1781. 8vo. This collection was thrown into lots by Lee the numbers corresponding to those of the manuscript catalogue of Fothergills garden in my possession drawn up by me at the request of Fothergills executors. See *Letts. upt.* [See also *Upton garden.*]

Gateshead nursery in the county of Durham, on coal measures? cultivated by Mr. Fala and son.

Gisborne Mr. T. of Yoxal lodge in Staffordshire, prebendary of Durham and author of treatises on morals. [Rev. Thomas Gisborne (1758–1846), uncle of Charles Cardale Babington.]

[*Gordon.* See *Mile-end nursery.*]

Hall [*Isaac*] of Newton Cartmell near Ulverston. See *Bot. arr.* [ed. 2] i. p. xi. I consulted his herbarium in the possession of his widow in Kendal.

Halifax garden on gritstone cultivated by Mr. Rawson.

Handsworth nursery E. of Sheffield on gritstone, cultivated by Littlewood and now by Messrs. Holmes and Fisher.

Hammersmith nursery in the valley of the Thames cultivated by James Lee author of the introduction to botany and by Messrs. Lee and Kennedy.

Hasland garden near Chesterfield cultivated by Mr. Claughton and sons.

Heringhay garden in Middlesex cultivated by Mr. Grey, contains many very rare plants.

Highfield garden on gritstone, cultivated by Mr. Eyre and afterwards by Mrs. Thomas who removed thither plants cultivated in Chesterfield.

Hollefear. See Bot. arr. [ed. 2] i. p. xi. Collected the plants of Worcestershire to which his name is subjoined, at Severn Stoke and Crome, when curate. The cultivator of Crome garden appointed him to the vicarage of Wolvey in Leicestershire, when relinquishing the study of nature and presenting me with his herbarium he gave himself up wholly to parochial duties.

Hort. kew. ed. II. Hort. kewensis 2nd edition enlarged by W. T. Aiton. 5 vols. 1810–1813. It is not properly an edition, the description and plates of the former work being omitted. Nothing is said in either publication of the founder of the garden.

Hudson apothecary in Panton street. He shewed me Peloria. The destruction of his herbarium and cabinet of insects by fire was a national loss and which Davies told me either caused or hastend his death. [William Hudson (1730–1793), author of the *Flora Anglica.*]

Islington garden in Middlesex, cultivated by W. Pitcairn physician, much employed in the city. [Plants from this garden are in Herb. Banks.]

Johnson Dr. of Coxbench near Derby, author of Animal chemistry, and of the greater part of the places of growth of plants in Pilkingtons Derbyshire. The American specimens to which his name is subjoined were gatherd on Long island, the neighbourhood of New York, Trenton, Philadelphia, Lancaster (with Muhlenberg), Harrisburgh, Sunbury, Northumberland, where he visited Priestley, whence he passed 300 miles up the Susquehana, returning by the same course to New York. The European specimens were collected in Switzerland.

Kew garden in Surry, in the valley of the Thames, laid out with great taste. Aiton the father shewed it me introduced by a letter from Curtis. He explained to me the plan of the catalogue which appeared some years after under the title of Hort. Kew. Aiton carried his specimens and doubts to Bankss library as I did those of the Upton garden, where they were examind and resolved by the polite and candid Solander, as his manuscript descriptions and specific characters in the British museum will testify (Aiton, W. b. 1731 d. 1793). [For an account of these MSS. see *The History of Aiton's Hortus Kewensis*, pp. 1–4 (Journ. Bot. 1912, Supplement III.): also issued separately.]

[*Knowlton.* See *Darley garden.*]

Lambeth garden in Lambeth marsh in the valley of the Thames, cultivated by Curtis who removed it to Brompton.

Letts. upt. Hortus uptoniensis in Fothergills works 4to p. 493. "Though I have endeavourd" says Lettsom "to render "the catalogue as complete as possible I am aware of the possi-"bility of many inaccuracies and defects, but at the same time I "am conscious that I spared no labour to prevent them." As every plant enumerated is marked as kept in the stove or greenhouse it is apparently the sale catalogue of the hothouse and greenhouse plants sold on the 20th of Aug. 1781 thrown into an alphabetic form. See *Foth. cat.* This volume of Fotherg. by Letts. I saw for the first time a few years ago being with many others the gift of Wright. [John Coakley Lettsom (1744–1815).]

Lichfield garden. Cultivated by J. Saville vicar choral in Lichfield cathedral and on his decease incorporated with Mayfield garden. (b. 1736 d. 1803.) See Anna Sewards letters. [John

Saville, who died 2nd August, 1803, aged 67, is spoken of by Miss Seward as her dearest friend, as sharing Dr. Stokes's botanical enthusiasm, as having a considerable fund of scientific knowledge, and as being an intense student of botany. He was forty-eight years Vicar Choral at Lichfield and Miss Seward erected a monument to him in the Cathedral.]

Maresbrook garden near Sheffield. On gritstone. Cultivated by Mrs. Shore.

Mayfield garden near Manchester, on red ground? cultivated by Leigh Philips, merchant of Manchester, who purchased Savilles plants.

Mile-end nursery in Essex, in the valley of the Thames, cultivated by Gordon and afterwards by Gordon and Graeffer. [Plants from this garden are in Herb. Banks.]

Mount Pleasant garden near Sheffield, on gritstone, cultivated by Mr. Ward.

Newark nursery, cultivated by Mr. Ordoyno author of Flora nottinghamiensis.

Newbold garden near Chesterfield, on gritstone, cultivated by Mrs. M[argaret] Stovin an investigator and collector of plants. [The frequent references in the body of the work indicate that she had a considerable herbarium: it contained specimens from various parts of England and from many of the gardens mentioned by Stokes, some of them gathered by herself.]

Norton garden between Chesterfield and Sheffield, on gritstone, cultivated by Harriet Shore youngest daughter of —— Foy of Castle hill in Dorsetshire, an investigator and collector of plants (d. 1828).

The Oaks garden in the parish of Norton in Derbyshire, near Sheffield, cultivated by Sir W. Bagshaw.

Orford garden near Warrington in Lancashire, cultivated by J. and Ann Blackburne and the gardener Neal. See his catalogue. Aikin who studied in it carried me to see it. See *Forst. J. and G.* 12.

Perryhill nursery between Birmingham and Hales Owen, on gravel found by Brunton, cultivated by Brunton and Hunter and removed by Mr. Hunter to Soho.

[*Pitcairn.* See *Islington garden.*]

Rempston garden in Nottinghamshire near Loughborough, on blue lias, cultivated by Dowager Lady Sitwell.

Renishaw garden near Eckington in Derbyshire, on gritstone, cultivated by Dowager Lady Sitwell and afterwards by Sir G. Sitwell.

Riddgreen garden on stratified red clay, cultivated by J. and his daughter Penelope Stokes florists

Robinsons street garden on the E. side of Malvern Chace at the eastern foot of Malvern hill, on the rubbish of Malvern hill, cultivated by R. Ballard surgeon, whose herbarium is in the possession of Mr. Rufford of Badsey.

Robson, E. son [nephew] of Steph. Robson author of British flora, of Darlington in Durham. See Bot. arr. ed. iv. i. p. xiv.

Salt, cutler of Sheffield, a very accurate investigator of plants and insects, whose herbarium and cabinet form a part of the Sheffield museum.

Sansom fields garden in Worcester, on siliceous sand and gravel, cultivated by Jonathan Stokes florist, and his son.

Sheffield nursery in the parish of Norton in Derbyshire, north of Sheffield, on gritstone and peat, cultivated by Messrs. Oldham.

Sherards herbarium enriched by Dillenius and given by J. Sibthorp to the Oxford physic garden, I consulted for one genus but was greatly disappointed to find that the collectors had in no instance that I observd noted whence the specimens were obtained, in which respect the Linnaean herbarium also is very deficient.

[*Sneyd.* See *Belmont garden*, *Soho garden.*]

Soho garden N. of Birmingham on siliceous sand and gravel, cultivated by Boulton partner of Watt in the manufacture of Watts improved steam engine. Hither resorted on the Sunday nearest the full moon Jas. Watt engineer and fellow labourer with Black on latent heat, and who as well as Mrs. W. collected plants in Cornwal, Jas. Kier translator of Macquers chemical dictionary, Erasmus Darwin author of Zoonomia (a work which would be oftener consulted if it had an index to vols. and p.p.) and Phytologia, and who in conjunction with Boothby author of fables and Jackson the printer of the work, planned and published a translation of Linnaeuss gen. plant. and syst. veg. in 3 vols. 8vo, * and W. Withering who in conjunction with Sneyd of Belmont and Turton of Stafford planned, and which he afterwards executed, the first version, revised by me, of Linnaeuss generic descriptions and specific characters of British plants under the title of a botanical arrangement. On Priestleys accepting the office of pastor of the Presbyterian congregation in New meeting street in Birmingham the Lunar society changed its day of meeting to Monday, the members dining in rotation at each others houses, and continuing to do so til the Birmingham riots drove Priestley to Northumberland in the United States.

Sol. Solander whose observations enrichd the first edit. of Hort. kew. with specific characters and descriptions, left in manuscript descriptions of the plants found in the voyage with Cook round the world, and others cultivated in Kew Chelsea Upton and Islington gardens, whose specific characters are given in Hort. kew. a work which perhaps ought rather to have been stiled Hort. londinensis. (b. 1736 d. 1786.) [See *Kew garden.*]

[*Sole.* See *Bath garden.*]

Staveley garden cultivated by Mr. and Mrs. Foxlowe.

[*Stovin, Margaret.* See *Newbold garden.*]

Tapton garden near Chesterfield on gritstone, cultivated by Mr. Wilkinson.

Taylor, C. surgeon in the navy, son of J. and Eliz. of Stanton in the parish of Youlgrave in Derbyshire, born in 1762, was appointed in 1791 surgeon mineralogist and botanist to the Sierra Leone company, but returning in 1792, was taken prisoner in the Alert and sent to Quimper and in 1796 shipwreckd in the Amazon on the French coast and detained prisoner at Verdun, where he collected the specimens to which his name is subjoined. He was appointed to the Naid and arrived in port accompanied by La Brigada and Thetis register ship laden with dollars, when quitting the service he devoted himself to botany and mineralogy, dieing in London 28 Nov. 1818 aged 56, leaving a son Adolphus by his first wife and his second wife a widow without issue.

---

* This translation, entitled *The Families of Plants* (1787), seems to have been made by Jackson, a self-taught proctor in Lichfield Cathedral under the editorial supervision of Erasmus Darwin and Sir Brooke Boothby, and these three were the only members of the Lichfield Botanical Society. (Anna Seward, *Memoirs of Dr. Darwin*, pp. 98–100.) It was, in fact, published in four volumes as 'A System of Vegetables.' By a Botanical Society at Lichfield. Lichfield, 1783 (2 vols.), and 'The Families of Plants' (2 vols.) 1787.

Towns. Townsons travels in Hungary, 1797, 4to. Nativ of Shropshire. Accompanying a brother who went in an official situation he died a wealthy planter in Australia. His heirs will I hope give us the observations he must have made on every branch of natural history.

Trentham garden, on sand and gravel in the valley of the Trent, cultivated by the rector T. Butt is a very extensive collection of hardy plants.

Upton garden in Essex between Stratford and Ilford, in the valley of the Thames, cultivated by Fothergill the physician, who engaged Miss Lee and professd artists to make colourd drawings of the rarer plants. In conjunction with Pitcairn and Banks he sent out persons to collect plants in the Alps. [See *Letts. upt.*]

Whitburn garden on the sea shore of Durham between the Tyne and Wear, cultivated by the rector Mr. Baker.

Willd. bot. Willdenows principles of botany. 1805. 8vo. A book which should be in the hands of every student. The translators note at p. 464 stands in need of correction. In a future edition the translator will I hope give us t. 10 in colours more accordant with nature. Whatever the original may be that in the translation can only mislead. Surely some of our artists are competent to supply this deficiency. Those who may attempt it will do well to read what M. de Candolle has written on the subject in his *theor.* 520-526, and naturalists may note down the animals and plants whose colours Linnaeus has described, and discriminate the shades of brunneus badius fulvus ferrugineus in bay horses red cows red deer fawns dormice foxes, wolves according to Decandolle and fulvous lions.

Williams, Mr. J. minister of the presbyterian church in Mansfield. [Collected *Utricularia minor* at Altringham, Lanc. (p. 126) and *Valerianella carinata* at Calver, Derbyshire (p. 192).]

Wilsons nursery near Sheffield in the valley of the Dun, on gritstone, contained a very extensive collection of hardy plants, dispersd on the death of the cultivator.

Wright, W. M.D. memoir of, with a selection of his papers on medical and botanical subjects. 1828. 8vo. with an engraved portrait, which is a striking likeness. It is published by his three nieces as a memorial of their affection. (b. 1735, d. 1819.) [The memoir was, according to a letter, dated 1827, by Anne Wright (one of the nieces?) to Robert Brown, written by Dr. Mitchell. See *Edinburgh garden.*]

NOTULÆ AD ALGAS JAPONIÆ.—I.

By Seiitchi Narita.

Codium mucronatum J. Ag. var. californicum J. Ag. Till Algernes Systematik, viii. p. 44, t. 1, f. 3; Kjellm. Marin. Chloroph. Jap. p. 34; De-Toni, Syllog. Alg. i. p. 495; Setch. et Gard. Algæ North-west America, p. 232; Okam. Nippon-Sōrui-Meii ("A Synoptical List of Japanese Algæ"), p. 188; *id.* Alg. Jap. Exsiccata, i. No. 50; Matsum. Ind. Pl. Jap. i. 53.
Hab. Japan: widely distributed.

C. divaricatum Holmes in Journ. Linn. Soc. Bot. xxxi. p. 250, pl. viii. f. 2*a*, 2*b*; Okam. Nippon-Sōrui-Meii, p. 189; Matsum. *l. c.* p. 52. C. fronde repetiter dichotoma, sæpe trichotoma, axillis rotundatis, infra axillas cuneato-dilatata aut triangulo-dilatata complanata aut subcomplanata, apicibus divaricatis, superficie pl. m. granulosa; segmentis omnibus elongatis aut inferioribus superioribusque contractis aut superioribus elongatis inferioribus contractis; utriculis clavato-cylindraceis, apice dilatatis rotundatis aut subtruncatis, diametro 2–5-plo longioribus; colore saturate v. pallido-viridis.

Var. inflectum Narita, var. nov. Fronde irregulariter dichotoma aut fere trichotoma aut prolifera, infra axillas cuneato-dilatata aut sensim dilatatiuscula aut non dilatata, ramulis sæpe pl. m. inflectis. Cetera ut in typo.

Forma *α. dilatatum.* Fronde infra axillas cuneato-dilatata aut subtriangulo-dilatata.
Hab. Hamajima, Prov. Shima (*S. Narita*).

Forma *β. cylindricum.* Fronde cylindracea, infra axillis non dilatata aut sensim dilatatiuscula.
Hab. Hamajima, Prov. Shima (*S. Narita*); Wagu, Prov. Shima (Herb. Eith High School).
This species has very variable forms in both the outer and inner shape; some of them resemble *C, cylindricum* Holm. in the length of the utricles, but differ in the shape of apex of utricles, &c.

C. intricatum Okam. Icon. Jap. Alg. iii. p. 74, pl. cxx. figs. 9–13.
Hab. Wagu, Prov. Shima (Herb. Sakishima Fisheries School, Prov. Shima).

C. mamillosum Harv. Phyc. Austr. tab. 41; De-Toni, Syll. Alg. i. p. 491; *id.* Phyc. Jap. Nov. p. 63; Okam, Nippon-Sōrui-Meii, p. 188; *id.* Alg. Jap. exsicc. i. No. 49; *id.* in Matsum. et Miyoshi, Crypt. Jap. Icon. Illust. i. t. 30; Matsum. Ind. Pl. Jap. i. p. 52.
Hab. Hamajima, Prov. Shima (*S. Narita*).

C. latum Suring. Algæ Jap. p. 22, t. vii; De-Toni, Syll. Alg. i. p. 497; Kjellm. Marin. Chloroph. Jap. p. 35; Okam. Nipp.-Sōru.-Me. p. 189. *C. Lindenbergii* (non Bind.) Hariot, De-Toni, Phyc. Jap. p. 64; Matsum. *l. c.* p. 52.
Hab. Oiso, Prov. Sagami (*Mis. M. Maruyama*).

Amphiroa sp. A. fronde cæspitosa, ca. 1–1·5 cm. alta, ca. 0·3–1 mm. latis; ramis paucis, patentibus, lateralibus, irregulariter dichotomis v. ramosis vel secundate proliferis, sub axillis dichotomis non ramorum geniculis; articulis cylindraceis ultimis subcomplanato-dilatatis vel subcompresso-obtusis, subequicrassis (ex. ult.), ca. 0·3–1 mm. latis, ca. 0·3–5 mm. longis, apice obtusis vel subdilatatis; geniculis linearibus; conceptaculis verrucæformibus.

Hab. Takeshima, Prov. Mikawa (*S. Narita*).

Amphiroa aberrans Yend. Cor. Ver. Jap. p. 16, pl. 1, figs. 1–5, pl. v. figs. 1–3; *id.* Rev. Lis. Corallin. p. 8.

Hab. Oiso, Prov. Sagami (*Mis. M. Maruyama*).

Cheilosporum californicum (Dcne.) Yend. Corall. Ver. Port-Renfr. p. 715, pl. liv. fig. 20, pl. lvi. fig. 3; *id.* Rev. Lis. Corall. p. 19.

Hab. Kujiikurigahama, Prov. Bōshii (*Kako*).

Corallina sessilis Yend. Corall. Ver. Jap. p. 32, pl. iii. fig. 18, pl. vii. fig. 18; *id.* Rev. Lis. Corall. p. 31.

Hab. Kujiikurigahama, Prov. Hitachi (*Kako*).

C. officinalis L., C. Aresch. in J. Ag. Species, ii. p. 563; Yend. Corall. Ver. Jap. p. 28, pl. iii. figs. 11–13, pl. vii. figs. 10–13; *id.* Rev. Lis. Corall. p. 29.

Hab. Takeshima, Prov. Mikawa (*S. Narita*); Shinojima, Prov. Owari (Herb. Eith High School); Beppu, Prov. Bungo (*S. Narita*).

Chondria crassicaulis Harv., Holmes, *op. cit.*, p. 256, pl. viii. figs. 4*a*, 4*b*, 4*c*; J. Ag. Anal. Alg. (1892), p. 161; Okam. On the Veget. Multipl. of C. crassi. and its Syst. Posit. (Tokyo Bot. Mag. vol. xvii.), p. 1; *id.* Alg. Jap. Exsiccata, 1, No. 23; *id.* Icon Jap. Alg. i. p. 12, pl. iii. figs. 1–15; *id.* Nippon-Sōrui-Meii, p. 58; De-Toni, Phyc. Jap. Nov. p. 32.

Hab. Honsiu (= Mainland); Hokkaidō (= Yezo).

C. dasyphylla (Woodw.) Ag. Syst. Alg. p. 205; Hauck, Meeresalg. p. 210; De-Toni, Phyc. Jap. Nov. p. 32; Okam. Nippon-Sōrui-Meii, p. 57; Falkenb. Rhodom. p. 197, Taf. 22, figs. 4–18. *Laurencia dasyphylla* Grev. Alg. Brit. p. 112, t. 14, figs. 13–17; Harv. Phyc. Brit. pl. 152; Kuetz. Sp. Alg. p. 853; Martens, Tange (Preuss. Exped. n. Ost.-Asi.), p. 119. *Chondriopsis dasyphyllus* J. Ag. Species, ii. p. 809; *id.* Anal. Alg. p. 152. *Fucus dasyphyllus* Woodw., Turn. Syn. Fuc. p. 38; *id.* Hist. Fuc. t. 22.

Hab. Hokkaidō (*T. Satō*); Honsiu.

C. tenuissima (G. et W.) Ag. Syst. Alg. p. 205; Hauck, Meeresalg. p. 212; Harv. Ner. Bor.-Ameri. Par. ii. p. 21, tab. xviii. F; De-Toni, Phyc. Jap. Nov. p. 31; Okam. Nippon-Sōrui-Meii, p. 57; Falkenb. *l. c.* p. 195. *Laurencia tenuissima* Grev. Alg. Brit. p. 113; Harv. Phyc. Brit. Pl. 198; Martens, *l. c.* p. 119. *Chondriopsis tenuissimus* (G. et W.) J. Ag. Species, ii. p. 804. *Fucus tenuissimus* G. et W., Turn. Syn. Fuc. p. 35; *id.* Hist. Fuc. t. 100.

Hab. Beppu, Prov. Bungo (*S. Narita*); Shimmaiko, Prov. Owari (*S. Narita*).

Laurencia obtusa Lamx. Essai, p. 42; Grev. Alg. Brit. p. 111; Harv. Phyc. Austral. Syn. No. 302; *id.* Phyc. Brit. Pl. 148; J. Ag. Species, ii. p. 748; *id.* Epicr. p. 656; Martens, *l. c.* p. 119; De-Toni, Phyc. Jap. Nov. p. 31; Okam. Nippon-Sōrui-Meii, p. 55; Hauck, *l. c.* p. 206; Migula, Kryptgam.-Flor. ii. Teil 2, p. 64. *Chondria obtusa* Ag. Syst. Alg. p. 202. *Fucus obtusus* Huds., Turn. Syn. p. 43; *id.* Hist. Fuc. t. 21.

Hab. Shimmaiko, Prov. Owari (*S. Narita*); Kamagōri, Prov. Mikawa (*S. Narita*); Morozaki, Prov. Owari (*Takeuchi*); Beppu, Prov. Bungo (*S. Narita*).

L. pinnatifida Lamx. *l. c.* p. 42; Grev. Alg. Brit. p. 108, pl. xiv.; Harv. Phyc. Brit. Pl. 55; J. Ag. Species, ii. p. 764; *id.* Epicr. p. 656; Kuetz. Sp. Alg. p. 856; Hauck, *l. c.* p. 208; Harv. Ner. Bor.-Ameri. Par. ii. p. 70; Setch. et Gard. *l. c.* p. 326; Migula, *l. c.* p. 65; Okam. Nippon-Sōrui-Meii, p. 56. *Chondria pinnatifida* Ag. Syst. Alg. p. 201. *Fucus pinnatifidus* Huds., Turn. Syn. Fuc. p. 267; *id.* Hist. Fuc. t. 20.

Hab. Wagu, Prov. Shima (Herb. Eith High School).

Chondrus crispus (L.) Stackh., Grev. Alg. Brit. p. 129, t. 15; Harv. Phyc. Brit. Pl. lxiii.; Kuetz. Sp. Alg. p. 735; J. Ag. Species, ii. p. 246; *id.* Epicr. p. 178; Schmitz und Haupt. in Engl. & Plant. Natur. Pflanzenfam. 142, p. 35, fig. 215; Martens, *l. c.* p. 117; De-Toni, Syll. Alg. iv. sect. 1, p. 180; *id.* Phyc. Jap. Nov. p. 24; Hauck, *l. c.* p. 134, fig. 53 (nach Kuetz.); Migula, *l. c.* p. 31; Okam. Nippon-Sōrui-Meii, p. 24. *Fucus crispus* L., Turn. Hist. Fuc. tt. 216–217. *Chondrus polymorphus* Lamx., *l. c.* p. 39. *Chondrus incurvatus* Kuetz., Sp. Alg. p. 735.

Hab. Shinojima, Prov. Owari (Herb. Eith High School); Oiso, Prov. Sagami (*Mis. M. Maruyama*).

C. elatus Holmes, *op. cit.*, p. 252, pl. ix. f. 1; De-Toni, Syll. Alg. iv. sect. 1, p. 182; Okam. Alg. Jap. Exsiccat. i. No. 8; *id.* Nippon-Sōrui-Meii, p. 24.

Hab. Oiso, Prov. Sagami (*Mis. M. Maruyama*).

C. ocellatus Holmes, *op. cit.*, p. 252, pl. ix. f. 2; De-Toni, Syll, Alg. iv. sect. 1, p. 182; Okam. Nippon-Sōrui-Meii, p. 24.

Hab. Wagu, Prov. Shima (Herb. Eith High School).

Clavis *Chondri* specierum Japonicarum hucusque cognitarum extra inquirendas.

1. Fronde lineari, compresso-tereti haud complanata, apices versus bis terve furcata . . *Ch. elatus* Holm.
   Fronde plana, pl. m. foliacea, segmentis variabilis . 2.
2. Cystocarpiis minimis, ovalibus, in una pagina subprominentibus, altera impressa . *Ch. crispus* (L.).
   Cystocarpiis majoribus, in ramis numerosis, ocellatis, ovalis v. subsphæricis . . . *Ch. ocellatus* Holm.

Chondri species mihi inquirendæ v. ignotæ.

C. affinis Harv. Ner. Bor.-Amer. p. 181; J. Ag. Species, ii. p. 247; *id.* Epicr. p. 178; Kuetz. Sp. Alg. p. 737; De-Toni, Syll.

Alg. iv. sect. 1, p. 181; *id.* Phyc. Jap. Nov. p. 23; Heydrich, *l. c.* p. 293; Okam. Nippon-Sōrui-Meii, p. 25.

Hab. Formosa (*Warburg, Heydrich*).

Species mihi ignota.

C. PLATYNUS (Ag.) J. Ag. Species, ii. p. 246; Martens, *l. c.* p. 118; De-Toni, Phyc. Jap. Nov. p. 23.

Hab. Yokosuka; Nagasaki.

Species mihi inquirenda.

CHONDRUS, sp. nov., Yendo in litt. *Ch. ocellatus* Holm. var. Okam. MS. Nippon-Sōrui-Meii. C. fronde elata, plana, cuneato-dilatata, carnoso-cartilaginea, pl. m. foliacea, margine secundate prolifera, furcata v. simplici, extreme 4·5 dm. alta; ramis secundariæ flexuosis oblongis longo-spatulatis v. cuneatis ad basin attenuatis; junioribus roseo-purpureis adultis atro-purpureis; cystocarpiis ut in *Ch. ocellato.*

Hab. Prov. Awa; Prov. Sagami.

Species mihi ignota, diag. ex Yendoi (Jap.).

NOTES ON CHANNEL ISLANDS PLANTS.

By H. W. PUGSLEY, B.A.

THE following notes are the result of observations during a visit to Jersey and Guernsey in June last. Owing to the previous dry and warm spring some characteristic species, especially annual *Leguminosæ*, were not to be seen, but a few other plants, which in normal seasons flower much later, were already in bloom.

In Jersey the native flora appears fortunately to have suffered comparatively little in quite recent years from the processes of civilisation, but this is not so in Guernsey; and the present condition of Vazon Bay and the adjacent Grande Mare—evidently once a delightful botanical locality—is deplorable to the naturalist and a sad contrast to the somewhat similar district of St Ouen's Bay in Jersey. The preservation of this latter spot, if it likewise becomes threatened, might indeed be worthy of the consideration of the National Trust.

FUMARIA MURALIS Sond. subsp. BORÆI Pugsley (*F. Boræi* Jord.). Very abundant in the south-west portion of Jersey, occurring not only in cultivated fields but commonly on hedge-banks and walls with all the aspect of a true native. This Jersey form seems fairly uniform and is intermediate between Jordan's type and var. *britannica* Pugsley. On the whole, it is rather nearer the variety, differing in its more floriferous racemes and rather larger flowers.

The typical subspecies, a little dwarfed owing to the dry season and occasionally mixed with plants diverging towards var. *britannica*, was seen abundantly in fields along the southern cliffs of Guernsey; and a very handsome form (almost identical with my forma *rubens*), bearing large crimson flowers with whitish sepals, grew sparingly in a field at Cobo. In this field

F. Bastardi also occurred, and one hybrid plant (*F. Bastardi* × *Boræi*) was observed, which was quite barren, as is usual in *Fumaria* hybrids.

F. PARADOXA Pugsley. Plentiful in a small field in Forest Parish, Guernsey. New to the Channel Islands.

When fresh, this is an extremely beautiful fumitory owing to its long and graceful racemes and brilliantly coloured flowers. The plant referred to in Mr. Marquand's Flora (p. 48) as probably *F. speciosa* may belong here.

F. BASTARDI Bor. In Jersey, about Beaumont, and here and there west of St. Aubin's, but much less abundant than the subspecies *Boræi* and rarely seen except in cultivated ground. In Guernsey, in fields along the southern cliffs and at Cobo.

Var. HIBERNICA Pugsley. With the type in a field at Cobo. Very rarely, near Le Gouffre. Not before recorded for the Channel Islands.

Of *F. capreolata*, *F. Boræi* subvar. *sarniensis* and *F. Bastardi* var. *Gussonei*, which are already known to grow in these islands, I failed to meet with any examples.

SPERGULARIA ATHENIENSIS Ascherson. At the foot of walls about St. Helier's and in several places along the bay westwards, almost as far as St. Aubin's.

This plant, which is either spreading in Jersey or has been generally passed over as *S. rubra*, is reduced to a variety of *S. diandra* Boiss. by Mr. Druce (Journ. Bot. p. 401, 1907), but appears in Rouy & Foucaud's Fl. de France, iii. p. 311 (1896) as a subspecies of *S. rubra* Pers., to which it is evidently closely related.

Unless there is a difference in the colour of the corolla which cannot be detected in the dry state, the Jersey specimens exactly match the Greek example "De Heldreich, Herb. Græc. Norm. No. 590. *S. rubra* Presl.? var. *β atheniensis* Held. et Sart." on which Ascherson's species is founded; and in addition, they agree well with the description of *Lepigonum campestre* of Kindberg's Monograph, p. 35 (1863), which Ascherson cites as synonymous.

As Kindberg points out, *S. atheniensis* is intermediate between *S. rubra* and *S. salina* Presl., and in general features it is perhaps rather nearer the latter. Its more branching and floriferous habit, greater glandular development, longer leaves, dull and broadly triangular instead of silvery, lanceolate stipules, shorter pedicels, and purplish-pink instead of lavender corollas separate it from *S. rubra*: while *S. salina* is distinguishable by its usually less branching habit and fewer glands, white-eyed instead of concolorous corollas, larger capsules, and roundish seeds at least twice as large as the very small pyriform seeds of *S. atheniensis*. These latter seeds seem indistinguishable both in size and shape from those of *S. rubra*.

It would appear from the *Botanical Exchange Club Report* for 1912 (p. 238) that specimens varying between *S. atheniensis* and *S. salina* have been collected by Mr. W. C. Barton in Guernsey, but no intermediates of this kind were noticeable among the plants I saw in Jersey.

It has, perhaps, not been adequately pointed out that the corolla characters of the British Spergularias are usually constant and sufficient alone to determine the species. Of the two large-flowered kinds, *S. rupestris* Lebel has petals of a fine lilac colour (stated to be occasionally white by Linton in Fl. Bournemouth, p. 55), while in *S. marginata* Kittel., they are normally pale pink or almost white, except in a glandular form with relatively short pedicels (perhaps var. *glandulosa* Druce), in which they are sometimes of a fuller pink, shading to white towards the base. Among the small-flowered species, purplish-pink flowers with a distinct white eye are characteristic of *S. salina*, while in *S. rubra* the corollas are pale lilac or lavender, and in *S. atheniensis* purplish-pink and concolorous.

POLYCARPON TETRAPHYLLUM L. var. DIPHYLLUM DC. Prodr. iii. p. 376. *P. diphyllum* Cavanilles Icones, ii. p. 40, t. 151, f. 1.

Exsicc.—F. Schultz Herb. Norm. 53 bis, as *P. tetraphyllum* forma *minor condensata.*

St. Aubin's Bay, Jersey.

This distinct-looking Polycarpon, which seems to be one of the two forms noticed in Mr. Lester-Garland's Flora, p. 73, matches an authentic specimen from Cavanilles in Herb. Mus. Brit., and agrees well with his description if not with his somewhat crude figure. From typical *P. tetraphyllum*, which is characterised by its largely tetramerous leaves and very numerous flowers in a lax and much branched corymbose cyme, this variety appears to differ permanently by its smaller size, fewer branches with generally opposite leaves, and contracted, dense terminal cymes with much fewer but somewhat larger flowers.

P. alsinifolium DC. may be distinguished by its oval rather than obovate leaves and still larger flowers, with subentire and not emarginate petals, and five instead of three stamens.

In Rouy & Foucaud's Fl. de France, iii. p. 312, *P. tetraphyllum* is divided into two varieties: α *laxum*, which corresponds with the ordinary British form, and β *densum*, resembling and perhaps identical with var. *diphyllum* DC., to which the authors do not seem to refer.

HYPERICUM HUMIFUSUM L. var. DECUMBENS Reichb. Icon. vi. p. 68 (1844). (*H. decumbens* Peterman.)

Grève de Lecq, Jersey, and probably also in other localities.

This large form of *H. humifusum* agrees both with Peterman's diagnosis of his *H. decumbens* (Fl. Lips. p. 565) and with Reichenbach's figure of that plant (Icones, 5176). There seems little reason for referring it to var. *magnum* Bastard (Fl. Maine et Loire, Suppl. p. 45), which is not distinguished by acute and glandular-fringed sepals but by being four times as large as the type of *H. humifusum* in all its parts, with nearly cylindrical stems.

H. LINARIÆFOLIUM Vahl var. APPROXIMATUM Rouy ap. Magn. Scrinia, p. 245 (1892); Rouy & Foucaud Fl. Fr. iii. p. 345.

Cliffs near Fiquet Bay, Jersey.

This plant differs widely from typical *H. linariæfolium* (α *genuinum* Rouy & Foucaud) in its ascending and dwarfer habit, shorter, broader and more revolute leaves, more contracted cymes and shorter capsules. Babington's Jersey specimens in Herb. Mus. Brit. and others in Herb. C. Bailey belong to the same variety, and I was informed by Mr. Piquet Jun. that he regarded this plant as ordinary *H. linariæfolium* and knew of no other form in the island.

I have also a specimen of this variety collected in Alderney by Mr. C. R. P. Andrews in 1899.

GERANIUM PURPUREUM Villars. Near Vale Castle, Guernsey.

This plant, which is similar to Verlot's specimens in Herb. Mus. Brit. from different localities in Dauphiny, is almost scentless, glabrescent below but glandular-hairy above, especially on the sepals. Its leaves are finely divided, the flowers only half as large as those of *G. Robertianum* L. and the carpels glabrous and strongly transversely wrinkled. It may well be a distinct species, as treated in Gremli's Swiss Flora, but *G. modestum* Jord. and other small-flowered forms which Rouy & Foucaud unite with it as varieties afford perhaps a series of gradations to *G. Robertianum*.

EUPHRASIA OCCIDENTALIS Wettst. Quenvais, Jersey. L'Ancresse, Guernsey (very dwarf).

This is apparently the earliest flowering of our eyebrights. I have collected it in Devon and Cornwall during the month of June.

SALVIA VERBENACA L. var. OBLONGIFOLIA Benth. (*S. clandestina* Syme non L.; *S. Marquandii* Druce).

This interesting plant seems now on the verge of extinction at Vazon Bay. The few remaining individuals seen showed great difference in glandular development, one or two plants being almost eglandular; and the polymorphism of the corolla characteristic of all the forms of *S. Verbenaca* was still apparent, the corollas being mostly 12–14 mm. long and proterandrous, but in some racemes only 9 mm. in length and semi-cleistogamous with connivent lips. *Vide* Journ. Bot. pp. 103, 146, and 150 (1908).

PLANTAGO MARITIMA L. Occurs at Noirmont Point in Jersey, and about Fort George in Guernsey, in the clefts of dry rocks with a southern exposure in positions occasionally within reach of the salt spray. The plants of these situations, some of which are quite luxuriant, show no signs of the foliar depauperation which is generally obvious in this species when growing in maritime shingles.

HERNIARIA CILIATA Bab. Vazon Bay, Guernsey.

According to Mr. Marquand's Flora this species is confined to one spot in Guernsey, while *H. glabra* L. is widely distributed.

Syme states, however, that he had seen only *H. ciliata* from Guernsey (Eng. Bot. ed. 3, vii. p. 178), and Babington seems to have been latterly of the same opinion. Two gatherings from that island sent to the Watson Exchange Club as *H. glabra* in 1902 by the late Dr. Playfair were certainly *H. ciliata*. (*Vide* Report, 1902–3, p. 19.)

β ANGUSTIFOLIA nov. var. Perennis, habitu gracili laxoque et caulibus omnino pubescentibus vel etiam infra nodos paulo pilosis. Folia parva (3–5 mm. longa, 1-2 mm. lata), anguste elliptica oblanceolatave, subacuta, ciliata. Sepala sæpius valde ciliata. Aliter ut in typo.

Habitat in Cæsareâ (St. Aubin's Bay).

This plant, which I unfortunately neglected to look for in Jersey, is described from specimens sent to the Watson Exchange Club in 1902 by Dr. Playfair as *H. glabra* var. *subciliata* Bab. and passed in the Report under that name. Similar specimens of an earlier date exist in Herb. Mus. Brit.

From its pubescent stems and narrow leaves this plant no doubt recalls *H. glabra* rather than ordinary *H. ciliata*, but it is evident, upon examination of the flowers, fruits, and seeds, quite irrespective of its perennial habit, that it belongs to the latter species. It is in part the origin of Babington's var. *subciliata*, which was described from St. Aubin's Bay, under *H. glabra*, with the diagnosis "foliis plus minusve ciliatis" (Primit. Fl. Sarn. p. 39, 1839). But as Babington at the same time recorded the type of *H. glabra* from this locality, where one form only, varying in degree of hairiness, is apparently known, it is clear that he was led by its general facies to regard it as *H. glabra*, and noting the strong ciliation of some individuals, to distinguish them as a variety on this ground alone. His varietal name, therefore, can hardly be adopted for a plant which at that time was both his type and variety, and hence the name *angustifolia* has been substituted. It may indeed be doubted whether *H. glabra* L. occurs at all in the Channel Islands.

A fragmentary specimen in Herb. Mus. Brit. labelled "*H. glabra* (annuente Babington), Ruan Minor, 1840, W. Borrer," which apparently gave rise to the record of *H. glabra* for the Lizard, is also referable to this variety.

The British Herniarias may be contrasted thus :—

H. GLABRA L. Spec. Plant. 218 (1753). Icon. E. B. 206.

Usually annual or biennial. Stem prostrate, herbaceous, finely pubescent, much branched from the base. Stipules membranous, greenish, small and inconspicuous. Leaves oblong-elliptical, generally broadest about the middle but at times attenuate below, subacute, glabrous or ciliate with deciduous hairs. Flowers very small, crowded, in clusters mostly in the axils of secondary branches, which hence assume a spike-like appearance. Sepals ovate-oblong, subacute, less than 1 mm. long, normally glabrous ; anthers yellow ; stigmas slightly divergent. Fruit ellipsoid, acute, exceeding the sepals ; seed ovate, minute.

As stated by Linnæus, *H. glabra* is a plant of dry gravelly soils, and the form of the eastern counties of Great Britain here described, with which most of the Continental material in Herb. Mus. Brit. under this name agrees, is of annual or biennial duration. Rouy (Fl. France, xii. p. 8) says it is "rarement perennante," and although Babington formerly considered it perennial, in the later editions of the *Manual* this is altered to "annual or biennial."

The *Herniaria* sold by nurserymen as *H. glabra* differs from this plant in being perennial, and is generally wholly glabrous except for a very few hairs about the apex of its oblong-obovate leaves. It may be a distinct species, and seems to be the *H. glabra* of Coste's Fl. de France (ii. p. 102), which is said to be perennial. I have collected a similar perennial and nearly glabrous form growing with *Scleranthus perennis* in the High Alps (Saas-Fee at 6000 ft. alt.), but my specimens, though flowering freely, show no developed fruit. The following detailed descriptions may be useful:—

H. CILIATA Bab. in Trans. Linn. Soc. xvii. p. 453 (1836); Eng. Bot. Suppl. 2857 (1843). Icon. E. B. S. 2857.

Perennial. Stem prostrate, fruticose and naked below, finely pubescent above (usually on the upper side only), irregularly branched and often elongate. Stipules membranous, whitish, larger than in *H. glabra.* Leaves subrotund-ovate to oval or oblong, rarely attenuate below, obtuse, glabrous or ciliate with deciduous hairs. Flowers much larger than in *H. glabra*, less crowded, in smaller and rarely confluent clusters. Sepals oblong, obtuse, about 1 mm. long, sometimes glabrous but often tipped with a deciduous bristle and ciliate with pilose hairs; anthers tipped with red; stigmas strongly divergent. Fruit subrotund-oblong, obtuse, equalling the sepals. Seed subrotund-ovate, twice as large as in *H. glabra.*

β ANGUSTIFOLIA. Slender and lax in habit, with stem pubescent all round and almost pilose below the nodes. Leaves small, narrowly elliptic or oblanceolate, subacute, ciliate. Sepals ciliate.

H. ciliata, which invariably grows in maritime situations, was well described by Babington in Eng. Bot. Supplement. It is reduced by Rouy (Fl. France, xii. p. 8) to a variety of the Portuguese *H. maritima* Link ap. Schrader Journ. i. p. 57 (1800), and Neues Journ. i. pars 2, p. 136 (1806). Portuguese specimens in Herb. Mus. Brit. (Schultz, Herb. Norm. nov. ser. cent. 29, no. 2829, and Welwitsch, Fl. Lusit. no. 528) show that the two plants are closely allied, but the woody roötstock, thick rugose stems, and strongly pilose leaves and calyx of *H. maritima* lead me to doubt whether they are conspecific. Willkomm & Lange (Fl. Hisp. iii. p. 151) adopt the name *H. ciliata* Bab., showing *H. maritima* Link as a synonym.

ALABASTRA DIVERSA.—PART XXV.

By SPENCER LE M. MOORE, B.Sc., F.L.S.

(Continued from p. 296.)

2. DE VERNONIACEIS AFRICANIS NOTULÆ ULTERIORES.

Erlangea (§ BOTHRIOCLINE) **Rogersii**, sp. nov. Caule erecto sat valido superne ramulos paucos graciles procreante hispide piloso deinde glabrescente, foliis oppositis oblongo-oblanceolatis acutis basi in petiolum brevem angustatis margine serrato-dentatis membranaceis pag. sup. pilis strigillosis appressis inspersis subtus in nervis sparsim pubescentibus, capitulis submediocribus circa 24-flosculosis in corymbum laxum folia excedentem bracteatum pubescentem digestis, involucri 4-serialis phyllis ovatis obtusis intimis oblongo-lanceolatis acutis interioribus perspicue purpureo-marginatis fere nisi admodum glabris, flosculis longe exsertis, achæniis cylindrico-turbinatis prominenter 5-costatis glabris, pappi setis caducissimis scabridis dilutissime stramineis. *Erlangea longipes* S. Moore quoad specimina Swynnertoniana (Journ. Linn. Soc. Bot. xl. 104).

Hab. Belgian Congo, Elisabethville; *Archdeacon Rogers*, 10918.

Folia profecto evoluta 6–9 × 2·5–3 cm., in sicco læte viridia, subtus paullo pallidiora; petioli lati, pubescentes, 5–8 mm. long. Corymbus circa 10 × 13 cm.; hujus rami sat distantes, sæpissime 6–10-cephali; bracteæ inf. foliaceæ, 2–5 cm. long., summæ lineares, ± 5 mm. long.; pedunculi proprii graciles, plerique 5–10 mm. long. Capitula pansa 8 × 7 mm. Involucri phylla ext. 2 mm., interiora 4 mm., intima 5 mm. long. Corollæ fere a basi gradatim amplificatæ, in toto 7 mm. long. (lobi 3 mm.). Achænia pallide brunnea, 1·5 mm. long.; pappi setæ 1·75 mm. long.

Differs from *E. longipes* S. Moore chiefly in the shape of the involucral leaves and in the achenes.

Erlangea (§ EU-ERLANGEA) **schebellensis**, sp. nov. Caule erecto inferne nudo superne pauciramoso foliosoque pluristriato pubescente cito glabrescente, foliis alternis sessilibus anguste obovato-oblongis obtusis margine calloso-dentatis membranaceis utrobique scabriuscule puberulis, capitulis pro rata parvis paniculam corymbosam bracteatam pubescentem folia facile excedentem efformantibus, pedunculis propriis involucra excedentibus æquantibusve, involucri campanulati 4-serialis dilute straminei phyllis extimis abbreviatis exterioribus ovato-lanceolatis interioribus lineari-lanceolatis omnibus obtusis margine ciliolatis dorso leviter scabriusculis, achæniis adhuc crudis cylindrico-turbinatis quam pappi setæ caducissimæ scabriusculæ paullulum brevioribus.

Hab. South Abyssinia, Schebelli; *Donaldson Smith.*

Folia subapproximata (internodiis 1–1·5 cm. long.), ± 4 cm. long., 1·5–2 cm. lat., in sicco dilute viridia. Panicula circiter 10 × 8 cm.; bracteæ inferiores foliis similes sed minores, ceteræ

imminutæ, ultimæ lineares ± 3 mm. long. Pedunculi proprii ut paniculæ ramuli graciles, ± 3 mm. long. Involucra 3·5 × 3 mm.; phylla extima 1–2 mm. long., intermedia 2·5 mm., intima 3 mm. long. Pappi setæ 1·5 mm. long.

Although the florets are still only in bud, there can, I think, be no doubt as to this belonging to an undescribed species. *E. ruwenyoriensis* S. Moore, to which it is nearest, has *inter alia* much larger leaves and acuminate involucral leaves.

Vernonia Tufnellæ S. Moore. Since Mrs. Tufnell sent home from Uganda the type specimen, this plant has been gathered by Mr. Dümmer at Kirirema, alt. 4000 ft. (No. 171). Zenker & Staudt 217 from Kamerun (distributed as *V. undulata* O. & H.) is conspecific with this, so that the species has a considerable range. Its affinity is with *V. biafræ* O. & H.

Vernonia (§ *Lepidella*) *oocephala* Bak. var. nov. ANGUSTIFOLIA. Ob folia angusta 2–5 rarius 7 mm. lat. primo obtutu recognoscenda.

Hab. Angola, Kubango, in open Mumua woods at Gimbundo Jamaiambe, River Kutato; *Gossweiler*, 3974. Belgian Congo, Kundelungu, under trees; *Kassner*, 2777.

The heads and florets of this variety are slightly smaller than those of the type at Kew which came from the Tanganyika district, otherwise no further difference is perceptible. Kassner's specimen has still narrower leaves than have the specimens of Gossweiler's collecting, and never, upon the specimen to hand, exceed 2·5 mm. in width.

Heads oblong when young, afterwards becoming turbinate or even narrowly campanulate, each of 4–5 series of dirty white or very pale grey hairy involucral leaves enclosing about seventeen shortly exserted florets. Involucres 1 cm. long; the whole head, when the florets are expanded, 1·5 cm. long. Corollas subcylindrical 8 mm. long., apparently white. Achenes (unripe) 1·5 mm. in length; outer scales of pappus narrow-linear, 1 mm. or a little more long; setæ of pappus 2–3-seriate, 7 mm. long., dirty white or the palest straw colour.

Vernonia Petersii O. & H. Rhodesia, Deka siding; *F. Eyles*, 135.

Vernonia Wollastonii S. Moore. Uganda, grassy lands, Kirirema; *Dümmer*, 207. Rhodesia, Victoria; *Monro*, 1550, 1990.

Vernonia Bainesii O. & H. Rhodesia, Victoria; *Monro*, 1272.

Vernonia Melleri O. & H. Rhodesia, Mazoe district; *Eyles*, 185. Belgian Congo, Lakania; *Rogers*, 10023.

Vernonia (§ LEPIDELLA) **orgyalis**, sp. nov. Caule elato erecto hispidulo-puberulo deinde glabrescente, foliis brevipetiolatis obovato-oblanceolatis acutis basi cuneatim angustatis margine dentatis summis imminutis subsessilibus oblongo-lanceolatis margine denticulatis membranaceo-coriaceis utrobique scabridis, capitulis mediocribus circa 23-flosculosis in paniculam corymbosam terminalem bracteatam laxe pluricephalam digestis, pedunculis propriis involucris longioribus hispidulo-pubescentibus sursum bracteis parvulis in involucri phylla transeuntibus onustis,

involucri campanulati pluriserialis phyllis anguste lineari-lanceolatis (intimis lineari-oblongis) acutis deorsum coriaceis diluteque stramineis sursum membranaceis intimis apice atropurpureis omnibus dorso hispidulis, corollis exsertis, achæniis cylindricis basi callosis 10-costatis appresse setosis, pappi squamis parvulis linearibus setis apice aliquantulum compressiusculis dilute stramineis scabridis.

Hab. Angola, Cazenzo, in waste places at Carmandai; *Gossweiler*, 5002, 5267.

Planta perennis, orgyalis. Caulis sat robustus, 4–5 mm. diam. Folia inf. 8–12 × 3·5–5 cm., in sicco griseo-viridia, sub lente minutissime glandulosa; petioli circa 5 mm. long. Inflorescentiarum bracteæ inf. foliaceæ, ± 4 × 1·5 cm., sup. gradatim imminutæ, summæ lineares, circa 3 mm. long. Inflorescentia tota 17–20 × 16–18 cm. Pedunculi proprii sæpissime circiter 2·5 cm. long. Capitula pansa 16 × 18 mm. Involucri phylla exteriora 3–5 mm., intermedia 6–7 mm., intima 8 mm. long. Flosculi cupreo-virides. Corollarum tubus angustus, extus sparsim papillosus, 9 mm. long.; lobi oblongi, acuti, 5 mm. long. Styli rami 3 mm. long. Achænia 3–3·5 mm. long. Pappi squamæ 1–1·5 mm., setæ 9 mm. long.

Differs from *V. Melleri* O. & H. in its broad leaves, small heads with shorter involucral leaves, small corollas and short pappus of fewer thicker setæ and smaller scales.

On p. 91 will be found a description of *V. paludigena*, a species referred by an oversight to § *Xipholepis*, whereas it really belongs to § *Lepidella*. *V. Melleri*, *paludigena* and *orgyalis* stand in close relationship; the former was considered by Oliver and Hiern to belong to § *Xipholepis*.

V. Migeodi S. Moore. The type specimen is from S. Nigeria (Lokoja or Abbeokuta). More lately it has been collected in the same country by A. E. Kitson at Nofia, and in N. Nigeria at Nupe by C. C. Yates, and on the River Benue by P. A. Talbot. At Kew, Lagos, *Phillips*, No. 50 belongs to this species.

Var. LEPTOLEPIS (var. nov.). Involucri phylla interiora acuminata, circa 8 × 1·25 mm. Cetera typi. South Nigeria, Ozobolo; *A. E. Kitson*. [Also at Kew, Western Lagos; *Rowland*.]

V. guineensis Benth. Sierra Leone, Scaries River; *Scott Elliot*, 4842. (Distributed as " *V. firma* O. & H.")

Vernonia (§ STENGELIA) **Hierniana,** sp. nov. Caule erecto fere a basi folioso molliter fulvo-tomentoso, foliis subsessilibus anguste obovato-oblongis obtusis margine crenato-dentatis coriaceis supra scabridis subtus fulvo-tomentosis, capitulis mediocribus in corymbum pauci vel pluricephalum dispositis, pedunculis propriis quam involucra brevioribus sæpissime bracteis linearibus perpaucis onustis, involucri campanulati phyllis 6-seriatis ovato-oblongis (intimis oblongis) coriaceis glabris vel fere glabris appendice brevi ovata obtusissima apice sæpe mucronulata griseo-tomentosa præditis, corollis exsertis, achæniis cylindricis 6-costatis breviter sericeis, pappi setis pluriseriatis exterioribus brevioribus interioribus complanatis omnibus obscure

ciliolatis rubiginoso-stramineis.—*V. guineensis* O. Hoffm. in Bol. Soc. Brot. xiii. p. 12, non Benth. *V. ulophylla* O. Hoffm. var. *Hoffmanniana* Hiern in Cat. Welw. Pl. i., p. 534.

Hab. Angola, Pundo Andongo, in forest between Calunda and Mangue; *Welwitsch*, 3278.

Folia 9–10 × 2·8-3 cm., exstant vero pleraque minora ± 6 × 2 cm., pag. sup. fusca; petioli modo 2–3 mm. long. Corymbi usque ad 16 × 12 cm., sed sæpius breviora, rarissime ad capitulam unicam reducti. Bracteæ foliis similes sed multo minores, sc. ± 15 × 5 mm. Pedunculi proprii ± 6 mm. long., horum bracteæ ± 10 mm. long. Capitula pansa 2 × 2 cm. Involucri phylla extima circa 6 mm., intermedia 11 mm., intima 13 mm. long.; appendix ± 3 × 3 mm. Corollæ cærulescentes; tubus angustus, 12·5 mm. long.; lobi lanceolato-oblongi, 5 mm. long. Styli rami 4 mm. long. Achænia 3 mm. long.; pappi setæ extimæ 2·4 mm., interiores 11 mm. long.

Remarkably homoplastic with *V. ulophylla* O. Hoffm. and *V. guineensis* Benth., but easily recognisable from the former by the short and broad appendices to the involucral leaves, from the latter by the differently shaped foliage leaves and the larger heads with different involucres.

V. Kaessneri S. Moore. British E. Africa, Ukamba, Lamuru; *Scheffler*, 273.

V. chthonocephala O. Hoffm. Belgian Congo, Elisabethville; *Rogers*, 10009.

V. nandensis S. Moore. Uganda, Toro; *Mrs. Tufnell.*

V. subaphylla Bak. Belgian Congo, Elisabethville; *Rogers*, 10163, 10389.

This belongs to § *Stengelia*, the affinity being with *V. armerioides* O. Hoffm.

Involucre 5-seriate, its outermost leaves 3–5 mm., intermediate 7–9 mm., and innermost 12 mm. long, palest green with a brown-purple appendage usually 3–5 mm. in length. Corollas subincluded. Achenes 8-ribbed, narrowed towards the slightly callous base, pale straw-coloured. Outer pappus of narrowly linear 2 mm. long scales; inner 7 mm. long, of shortly but closely ciliate hairs, straw-coloured.

3. Acalyphæ ex Peruvia species nova.

On p. 263 of this volume appeared descriptions of three new South American Composites from a small collection made by Mr. H. O. Forbes. A fourth plant, believed to be new, is the following:—

Acalypha Forbesii, sp. nov. Caule folioso dense albo-pubescente mox glabrescente, foliis parvis ovatis sæpe breviter 3-lobis obtusis basi rotundatis 5-nervibus margine crenatis membranaceis supra pilis strigillosis appressis sparsim inspersis subtus præsertim in nervis pubescentibus petiolo sat longo tenui albo-pubescenti fultis, spicis subsessilibus axillaribus terminalibusque bisexualibus parte masc. valde abbreviata, mox deflexa

parte fem. densibracteata oblonga terminali folia excedente vel æquante, bracteis fem. basi cum pulvinulo 1-floro connatis medium usque vel paullo ultra 3–5-lobis lobis lanceolato-oblongis obtusis integris vel latere uno dente instructis membranaceis extus pubescentibus, ovario breviter hispidulo, stylis a basi liberis brevibus paucilaciniatis haud coloratis.

Hab. Peru, in valley between Pacasmayo and Rail-head, 7000 ft.; *H. O. Forbes.*

Foliorum limbus circa 3 × 2 cm., supra in sicco dilute viridis subtus brunneus; crenaturæ circa 1 mm. alt. et 1·5 mm. long.; petioli 1·2 cm. long. Spicæ axillares abbreviatæ, circiter 12 mm. long. Spicæ terminales fere 4 cm. long. et 8–9 mm. lat. Spicæ pars masc. vix 3 mm. long. Bracteæ extus nervosæ, basi decolores, sub flore circa 2·5 × 2·5 mm., cito usque ad 5 × 6 mm. amplificatæ, harum lobi 2–3 mm. long. Sepala 4, ·75 mm. long. Ovarium globosum, 1 mm. diam. Styli fere 2 mm. long. Capsula triloba, circa 2 mm. diam. Semina 1 mm. long.

The affinity is with *A. boliviensis* Müll. Arg., from which it differs, *inter alia*, in the bracts of the female flowers.

4. Asclepiadacea nova tropicali-Africana.

Asclepias rivalis, sp. nov. Circiter bispithameus, caule erecto sat valido superne sparsim folioso deorsum foliorum dilapsorum signis notato sursum (ut rami) folioso, foliis sessilibus anguste lineari-lanceolatis acutis coriaceis glabris, umbellis paucifloris pedunculis ex axillis foliorum superiorum oriundis suffultis, bracteis parvulis lanceolatis acuminatis, pedicellis pedunculis brevioribus (ut pedunculi) glabris, calycis segmentis lanceolatis acuminatis glabris, corollæ rotatæ lobis oblongo-ovatis obtusis glabris reflexis, coronæ phyllis juxta medium columnæ stamineæ insertis eidemque circiter æquialtis cucullatis intus ecornutis margine terminali fere horizontali integroque utrinque ad angulum internum in lobum perspicuum erectum lanceolatum acutum excurrente, antherarum alis sat prominentibus appendicibus stigmati applicatis, folliculis ovato-oblongis superne in rostrum brevem gradatim excurrentibus glabris.

Hab. Angola, grassy bank of the River Lucalla; *Gossweiler*, 5771.

Folia ± 10 cm. × 6 mm., in sicco viridia; costa media pag. inf. prominens. Pedunculi vix usque ad 5 cm. long., summi vero breviores. Bracteæ 2–3 mm. long. Pedicelli graciles, sub flore ± 1·5 cm. sub fructu sæpius circa 3 cm. long. Flores albi, suaveolentes. Calycis segmenta 3 mm. long. Corollæ tubus 2 mm., lobi 7 mm. long. Coronæ phylla ad 1·5 mm. supra basin columnæ stamineæ affixa, in toto 2·5 mm. long. Pollinia oblonga, 1 mm. long.; caudiculæ glandulæ æquilongæ, ·3 mm. long. Folliculi 4–5 cm. long., juxta medium 8–10 mm. lat.; rostrum circa 1·5 cm. long.

Near *A. physocarpa* Schlechter and *A. leucocarpa* Schlechter, but with marked difference from both in foliage, corona, and follicles.

AN AUSTRALIAN NEW *DIOSPYROS*.

By W. P. Hiern, M.A., F.R.S.

At the session of the British Association, held at Melbourne on August 14th, 1914, in my paper on Australian *Ebenaceæ*, a new species, *Diospyros longipes*, was described. It differs from its Australian allies by the comparatively greater length both of the fruit-stalk and of the petiole.

The following is a detailed description of the female plant in fruit; the male is at present unknown:—

Diospyros longipes Hiern, sp. n. D. fruticosa vel arborescens, novitiis ferrugineo-hirsutis, ramulis mox glabrescentibus alternis erecto-patentibus duris gracilioribus fusco-cinereis teretiusculis levibus apicem versus foliosis, foliis alternis ovato-lanceolatis apice sæpius sub-obtuse acuminatis basi sub-æqualiter vel inæqualiter angustatis tenuiter coriaceis tenacibus plus plusque glabratis utrinque pallidis glauco-nitidis concoloribus margine integerrimis atque angustissime revolutis vix undulatis 5–10 cm. longis 2–4 cm. latis, costâ tenui validâ expressâ primum pubescente mox glabrescente, venis lateralibus numerosis patulis tenuissimis, petiolo gracili angulari 12–25 mm. longo valido primum sub-pubescente mox glabrescente. Calyce femineo profunde 4- vel inæqualiter 5-lobo hirsuto pubescente, in fructu late hemisphærico coriaceo utrinque pubescente intus basim versus polito pallide luteolo-virescente ad basim fructus applicato, segmentis ovato-lanceolatis 4–5 mm. longis, ovario hirsuto, fructibus solitariis ellipsoideis flavido-pallidis paullum pilosis vel glabrescentibus c. 15 mm. longis c. 11 mm. latis apice stylo sub-persistente glabro tenui c. 4 mm. longo centrali præditis pedunculo prope apicem ramuli oriente solitario tenaci puberulo pallido c. 2 cm. longo suffultis, pericarpio crustaceo-coriaceo, semine solitario irregulariter oblongo-ellipsoideo pendulo c. 13 mm. longo c. 7 mm. lato testâ crassiusculâ.

Habitat prope oppidum "Townsville," in ditionis "Queensland" parte tropicâ, a cl. R. H. Cambage, F.L.S., 11 Aug. 1913, lecta.

Epharmosis. *Caulis* cuticula crassa; periderma sub-epidermide. *Foliorum* epidermidis superæ cellulæ recticurve delineatæ c. 11·29–15·8 μ altæ, cuticula crassiuscula levis; epidermidis inferæ cellulæ recticurve delineatæ c. 6·77–11·29 μ altæ, cuticula crassiuscula levis; stomata ovalia c. 25–26 μ longa c. 19–20 μ lata, ad æquilibrium epidermatis inferæ aperientia; mesophyllum bifaciale c. 8–10-seriatum c. 163–226 μ crassum; cellulæ paliformes vel inconstanter 2-ordinatim dispositæ superiores circiter 4-plo longiores quam latiores inferiores circiter duplo longiores quam latiores ambæ dimidium mesophylli implentes, vel 1-ordinatim dispositæ cum hypodermate transverse oblongis contento.

SILENE RIGIDA Banks & Sol.

By Frederic N. Williams, F.L.S.

Silene rigida Banks & Solander in P. Russell's *Natural History of Aleppo*, ed. 2, ii. p. 252 (1794): the short description is:—"Petalis integris, floribus fastigiatis, foliis lanceolatis obtusiusculis subtrinerviis villosis."

This is not sufficient to determine the position of the plant in the genus *Silene*. Fortunately, the specimen to which the description refers is in good state; and the capsules contain seeds, the structure of the seeds being an important character. With the help of the restricted material available the original description can be expanded, and the systematic position of the plant determined.

Examination shows that the specimen belongs to the subgenus *Eusilene*, sect. ii. *Dichasiosilene* (B. species annuæ), series 11. *Lasiocalycinæ*, in my revision of the genus in Journ. Linn. Soc. (Bot.) xxxii. 1–198 (1896). The species in this series are grouped under two heads:—

a. Petala integra vel emarginata.

b. Petala bifida vel bipartita.

It is certainly to the first of these two groups that the Aleppo plant belongs. The following description of the plant is so drawn up as to omit the sectional and serial characters:—

Caulis 15–28 ctim., erectus superne vel e basi divaricatim ramosus, breviter denseque scabrido-puberulus. Folia inferiora 25 mm., oblongo-spathulata, superiora 22 mm., lanceolata obtusiuscula subtrinervia villoso-scabrida. Flores subfastigiati, subsessiles; bracteæ lineares. Calyx coriaceus cylindricus, fructifer (14 mm.) clavatus infra capsulam constrictus, nervis scabro-echinulatis, dentibus ovatis rotundis late albo-marginatis ciliatis. Petala integra rosea oblongo-cuneata, appendicibus binis acutis. Capsula ovata, carpophoro crasso duplo longior. Semina dorso lato obtuse leviterque canaliculata seriatim tuberculata, faciebus curvato-excavata concentrice tuberculata (tuberculis parum majoribus).

This agrees very closely with the description of *S. gonocalyx* Boiss.; and the specimen matches Kotschy's *Pl. exs. Aleppenses*, 1841, n. 113, collected near Aleppo. This belongs to the species described by Boissier, and was issued under the name of "Silene echinata"; but it is not the European plant of that name, which is confined to Italy.

S. gonocalyx Boiss. and *S. crassipes* Fenzl. are closely allied, if not forms of the same species. In fact, in the Supplement to *Fl. Orientalis*, p. 92 (1888), Boissier has added a note:—"Est tantum forma *S. crassipedis* floribus terminalibus confertis, petalorum laminâ latiore rotundatâ nec retusâ." And this well applies to the specimen and to the brief description of *Silene rigida*.

SHORT NOTES.

Juncus tenuis Willd. in Somerset and Dorset. — Mrs. E. P. Sandwith has directed my attention to a quantity of this rush now doing well along a riverside path by the tidal Avon below Bristol. The standing of *J. tenuis* as a native British plant seems to be insecure. In the *London Catalogue* it is treated as indigenous, whilst Mr. Druce and others regard it with suspicion. Apart from Don's Scottish records, its history with us goes no farther back than thirty years or so, although to-day it is known in a number of widely separated stations. That a species so distinctly characterized should have been entirely overlooked in all these localities by our forerunners is difficult to believe; and I have little doubt that good judges are agreed that in most instances, if not in all, the plant has been introduced—probably from North America to begin with, and then when well established in one or two centres its dispersal would be comparatively easy. In this Avonside instance local botanists are clear that the plant cannot have been present more than three or four years at the outside; and that being so, the date of introduction would coincide with the erection of some fixed lights on metal standards which have been placed at various points along the river-bank as aids to navigation. These standards with their lighting apparatus were imported from Belfast, and our supposition is that *J. tenuis*, which has grown for years in Belfast Harbour, was brought thence in material used for packing, and in that way reached the spots where it is now found—not many yards from two of the lights in question. In Dorset, Mr. C. B. Green, of Swanage, has lately detected *J. tenuis* at Lilliput, near Poole Harbour, on gravelly ground recently disturbed by builders.—Jas. W. White.

Apium graveolens L.—My various records and specimens of this genus show it native in the following vice-counties:—1 to 6, 9 to 11, 13 to 29, 31, 33 to 35, 37 ?, 38, 39 ?, 41, 44, 45, 48 (specimen in Herb. Babington), 49 to 54, 58 to 64, 66 to 70, 73 to 75, 83 (Herb. Syme, &c.), 87, 89 (Herb. Babington), 101, 104. I should be glad of records for any of the missing counties, especially Beds (30), Northants (32), Cardigan and Montgomery (46, 47), Isle of Man and Dumfries (71, 72). Only genuine *native* records are of use.—H. J. Riddelsdell.

REVIEWS.

Ernährungsphysiologisches Praktikum höherer Pflanzen. V. Grafe. 494 pp. 186 text figs. Berlin: Paul Parey. 17 marks.

The present practical book on the physiology of plant nutrition will be very welcome, especially to those who are not specialists in physiology. Professor Grafe, of Vienna, well known for his researches in plant physiology and biochemistry, has here gathered together an immense amount of material. Papers as recent as 1913 are referred to, though the author's preface is dated January of this year. It may seem unpatriotic at the present time, in reviewing a book written by an Austrian and published in Germany, to find fault with the physiological text-books, both practical and theoretical, in use in this country. They are not such as place a student in a position to begin physiological research; and most botanists, who have of necessity to specialize, find themselves unable to follow the advances in this possibly the most difficult and one of the most attractive branches of botanical study, unless they have had the good fortune to graduate at one of the few universities where there are lectures by plant physiologists. Few students can read the language fluently enough to benefit to any great extent from a German text-book, but those will be able to understand from the present work the methods which are now being adopted in the investigations concerning plant nutrition. There are twenty-seven chapters, each of which is divided into convenient sections. Three chapters are devoted to germination and the conditions and various factors determining it: one each to ash analysis; carbon assimilation; fat, oil and wax; nitrogen assimilation; phosphates; enzymes; tannins; glucosides; the principal organic acids, alcohols and aldehydes; alkaloids; rubber; general plant analysis; sterilization of living plants; estimation of surface tension, permeability and osmotic pressure by plasmolysis; application of adsorption and capillarity to biochemical analysis; respiration; movement and growth promotion; growth measurement; measurement of gas and water movement; transpiration; bleeding; osmotic pressure; reaction of sap to indicators: and an appendix on normal solutions. The matter is throughout critically handled, and the author tells us in his preface that, with few exceptions, only those methods are included which he has himself practised either in the course of his own researches or in class. Full references are given to the original sources. There are a large number of tables, some of which occupy two or three pages. The book is exceptionally well illustrated. There are many original photographs, and most of the drawings are original. They are all clear and to the point. There is an index of four pages and a page of corrections. The book is well printed. An English book covering somewhat similar ground, either from a theoretical or a practical point of view, would be most welcome.

J. R.

Plants and their Uses: an Introduction to Botany. By FREDERICK LEROY SARGENT. Pp. 610, 8vo. London: Constable. Price 5s. net.

THIS book, which is of American origin, seems to consist of two not very obviously connected parts. The first half deals with economic botany under the heads of cereals, various food-plants, flavouring and beverage plants, medicinal and poisonous, and industrial plants. This part is very fully—perhaps too fully—

illustrated by blocks borrowed from a great variety of sources, with the result, for instance, that the text of page 91 is continued on page 100. A commendable attempt is made to give the etymologies of all technical terms: but "proteid" is not derived from the Greek "*protos*, before." Paragraphs on food as fuel, rations for human dietary, and tables of food values in calories are unusual if not inappropriate in such a work, nor can we understand the fetid oil of wintergreen appearing among flavouring essences and "food-adjuncts." This last convenient term was coined, by the way, by Sir Arthur Church in his book on food in 1876. "Earth-vegetables" does not strike us as a very happy term for "those garden esculents of which the nutritive part grows in the earth," *i. e.* tubers, bulbs, &c.; nor do we sympathize with the introduction of such attempted colloquial substitutes for common and not difficult terms, such as "sac-members" for "sporangia," "case-seed class" for "angiosperms," "spore-base fungi" for "basidiomycetes," &c.

The second half of the book is an introduction to systematic botany. It contains a brief historical chapter; thirty pages devoted to "The Crowfoot Family"; while thirty-two other families of phanerogams ("The Seed-Plant Division") are dealt with in about the same space; a brief but accurate chapter on "Kinship and Adaptation," including an account of de Vries's mutationism, and an assuredly unnecessary one of the nebular and planetesimal hypotheses; and life-histories of thirteen classes of cryptogams, from the "Tintball Alga" (*Chroococcus*) to "Martin's (*sic*) Selaginella." We object to the transfer of Theophrastus's title of "the Father of Botany" to Linnæus; but the most striking feature in this section of the work is the fearsome "plant formulæ" which the author has constructed for the genera of phanerogams. Our type does not enable us to reproduce one of these terrible productions, which seem even worse than those employed by Loudon. To the ordinary floral formulæ have been added symbols for the duration of the plant's life, leaf-arrangement, nervation and composition, the character of the inflorescence, of the floral receptacle, the pericarp and the ovules! This the writer complacently remarks "it is believed the student will find . . . not only labor-saving but helpful . . . as a ready means of comparing . . ." If this is so in America, American students must be very differently constituted in their eyes or their minds from English ones.

G. S. Boulger.

Lowson's Text-book of Botany: *Indian Edition.* Adapted by Mrs. J. C. Willis. W. B. Clive. Price 6*s.* 6*d.* 602 pp. 8vo.

In his preface to this book Dr. J. C. Willis truly says:—"The great failing of the Eastern student is his tendency to learn by rote." For this reason we doubt whether Lowson's Text-book was the best book to adapt for their use. That work, though it has long ago proved itself admirably adapted for the student "cramming" for an examination, is not, we think, so well calculated to provide him with a well-grounded knowledge of his subject as other later and more heuristic works issued by the same publishers.

Mrs. Willis has done her part of the work most admirably, substituting well-known Indian plants for many of those referred to in the original, and adding descriptions of Natural Orders characteristic of India, and a useful index of vernacular names. It would, however, have been better in this to distinguish Dravidian and Hindi names.

If we compare the book as a whole with Professor Daniel Oliver's adaptation of his Elementary Lessons for Indian use, published in 1869, we shall see the different standpoint of the "New Botany," which forty-five years has brought about.

In the next edition room might be found for a brief sketch of the component parts and geographical relations of the Indian flora and for the names of the leading district Floras. G. S. Boulger.

BOOK-NOTES, NEWS, &c.

At the meeting of the Linnean Society on November 5th, Mr. A. D. Cotton explained the scope of his paper on the Algæ, Lichens, and Fungi of the West Falkland Islands, from Mrs. Rupert Vallentin's collections, illustrated with specimens, drawings, and lantern-slides. He explained that a large collection had been made by Mrs. Vallentin from 1909 to 1911, and had been presented by her to the Royal Botanic Gardens, Kew; the present paper dealt with those cryptogams mentioned in the title, the Mosses and Hepaticæ being reserved for later work. These collections are valuable and have yielded interesting results, including several novelties, and many additions to the flora, and by means of ample, well-dried material, enabled previous descriptions to be enlarged and revised. The author gave an historical account of the cellular Cryptogams from the earliest record (1771) to the present time, and included in his list all previous records, revised so far as practicable. As regards the Fungi, spirit material and coloured drawings give, for the first time, a clear idea of the terrestrial fungus-flora. The genera are the same as those of Europe, and several of the common pasture species of England occur, such as the common Mushroom, giant Puff-ball, several Agarics, and the well-known *Cordyceps militaris*. Thirty-six species, including five novelties, are enumerated. Fruticulose and foliaceous Lichens were abundant and luxuriant in West Falkland, and in this respect the flora is in contrast with that of Kerguelen. There are several additions to previous lists. All the groups of Algæ flourish luxuriantly; the Reds and Browns being particularly large and fine. A considerable amount has been done in this section, twenty-eight names have been added, including three novelties, and seventeen have been removed as wrong records or synonyms. The distribution of the component parts of the flora was then described, with comparison of the Kerguelen lists, New Zealand, the sub-Antarctic zone, and the Antarctic region proper, the latter regarded as all south of 60° S.

lat. The lantern-slides from photographs taken during the two years of collecting were lent by Mrs. Vallentin.

The Physiological Institute of the Berlin University, which was founded by Schwendener in 1878 and was situated in the heart of the city, has been removed to Dahlem, opposite the Botanic Garden. Professor G. Haberlandt, who is now head of the Institute, delivered an inaugural address at the opening of the new building on May 14th. The address is published as a twenty-nine page pamphlet by Gebrüder Borntraeger, Berlin, the price of which is one mark. Haberlandt dealt with the place occupied by Berlin botanists in the history of plant physiology. By considering plant physiology in the widest possible sense and botanists connected with Berlin in any way, a remarkable list is given, including Wolff, Gleditsch, Link, Meyer, Sprengel, A. Braun, Pringsheim and Schwendener. The special ways in which these botanists influenced the study in general are briefly indicated.—J. R.

The *Proceedings of the Linnean Society* from November, 1913, to June, 1914, contains a full report of the paper by Dr. Lotsy on "The Origin of Species by Crossing," of which we gave an abstract on p. 175, and on the ensuing discussion in which Prof. Bateson, Dr. Gates, Dr. Keeble, Prof. Dendy, Sir Francis Darwin, Dr. Rendle, Prof. MacBride, Prof. Weiss, and others took part. "The divergence of opinion expressed," said Dr. Lotsy at the end of the discussion, "shows how little we really *know* of evolution."

The October number of the *Journal of Genetics* contains a paper by Miss M. Wheldale on "Our Present Knowledge of the Chemistry of the Mendelian Factors for Flower-colour." The colour varieties of *Antirrhinum majus* have provided useful material for the chemical interpretation of these, and an account is given of the pigments of these, illustrated by coloured figures of the excellence which is never absent from the plates of the Journal.

In the *Dublin Review* for October Mr. Britten gives an account of Robert James, eighth Lord Petre (1712–1742), of whom no detailed biography has hitherto appeared. A leading horticulturist of his time, whose "stoves" (hothouses) at Thorndon, in Essex, were the wonder and delight of his contemporaries, Petre was associated with the principal plant-collectors of his period and did much to encourage them in their work: among these were names of John Bartram, William Houstoun, Richard Richardson, and especially Peter Collinson, to whom we are indebted for most of our knowledge of Petre, with whom he was on terms of intimacy and affection. Collinson brought the stoves to the notice of Linnæus, who adopted the name *Petrea*, already suggested by Houstoun, for a well-known genus of *Verbenaceæ*. Aiton, in the *Hortus Kewensis*, attributes the introduction of numerous plants to Petre; he was, however, more than a cultivator—he had an extensive botanical library and a large collection of specimens filling fourteen thick folio volumes; this was unfortunately destroyed at the sale of the library in 1885–6.

INDEX.

For Classified Articles, see—County Records; Obituary; Reviews. New genera, species, and varieties published in this volume, as well as new names, are distinguished by an asterisk.

Acalypha Forbesii,* 336
Adventitious Flora in Cambridge, 46
African Vernonias, 89, 333; Asclepiads, 149, 332
Agrimonia Eupatoria var. sepium, 165
Agrostis verticillata, 276
Alabastra Diversa, 89, 146, 289, 333
Albury Park, Trees of, 24
Alchemilla acutidens, 287, var. alpestriformis,* 287; alpestris, 289; minor, 288; pratensis, 289; vulgaris forms, 281
Algæ, Distribution of British, 35; Japanese, 314
Alpine vegetation on Ben-y-gloe, 227, 277
Alsine, the Genus, 196; peploides, 201; rubella, 200; sedoides, 201; stricta, 200; tenuifolia, 201; verna, 200
Amphiroa, 315
Anagallis carnea, 274
Annona prætermissa,* 74
Antirrhinum, 249, 344
Apera interrupta, 217
Apium graveolens, 340
Aporuellia Guppyi,* 295; versicolor,* 295
Arctotis Scullyi,* 152
Arcyria nutans, 104
Ardisia Forbesii,* 291; venusta,* 292
Aristolochia pithecurus,* 296
Armeria arctica, 214
Arum spathes, coiling of, 258
Asclepias rivalis,* 337
Asperula nitida, 256
Asphodelus serotinus,* 13
Atropis iberica,* 14
Azolla in Britain, 209, 269

Badhamia alpina,* 99; foliicola, 99
Bailey's 'Cyclopedia of Horticulture' (rev.), 252
Baker, E. G., Nigerian Polypetalæ, 2; on Crotalaria, 224; Ranunculus ophioglossifolius, 277
Baker, J. G., 41; a correction, 77
Banana, The (rev.), 253
Barclay, W., Peter Ewing (portr.), 296
Bedford, E. J., Orchis hircina, 311
Begonia sogerensis,* 289
Bennett, A., Utricularia in Britain, 9, 47; Hydrilla in Britain (t. 534), 257; Habenaria montana, 307
Berlin Physiological Institute, 344
Bertya neglecta,* 151
Bibliographical Notes, 44
'Biographical Index,' 56
Bird-fertilization, 159
Blackman, V. H., Jost's 'Plant Physiology' (rev.), 157
Blake, S. F., Chimaphila domingensis,* 169
Blatter's 'Flora of Aden,' 255
Bolus Herbarium, Annals of, 159
Bolus's 'Icones Orchidearum' (rev.), 110
Bose's 'Irritability of Plants' (rev.), 153
Boulger, G. S., A. R. Wallace, 15; Jonathan Stokes, 299, 313; his 'British Flowering Plants' (rev.), 134; his 'Country Month by Month,' 191; Sargent's 'Plants and their Uses' (rev.), 341; Lowson's 'Text-book' (rev.), 342
Brachythecium trachypodium, 123
Bradley Bibliography, The, 55
British Algæ, Distribution of, 35; Rust Fungi, 51; Plants, 131, 255; Genera of, 186; Mycological Society, 187; Museum, Mesozoic Plants in, 278; Report of Bot. Dept., 307
Britten, J., 'The Department of Botany,' 45; Romulea parvi-

flora,* 46, 217; 'Index Kewensis' (rev.), 50; R. J. Gordon, 75; Horwood's 'Plant-Life' (rev.), 78; 'Flora of Norfolk' (rev.), 108; Bolus's 'Icones Orchidearum' (rev.), 110; 'Cambridge British Flora' (rev.), 131; 'British Flowering Plants' (rev.), 131; 'The Morisonian Herbarium' (rev.), 155; 'Flowering Plants of Riviera' (rev.), 185; 'Flora of Norfolk' (rev.), 220; 'Flora Orcadensis' (rev.), 222; Vaccinium Oxycoccos, 277, 311; Jonathan Stokes, 299, 313; Eighth Lord Petre, 344
Brown, N. E., retiring from Kew Herbarium, 280
Bucknall on Symphytum, 55
Bunyard on the Strawberry, 192
Burrell, W. H., Azolla caroliniana, 269

Callitris neo-caledonica,* 238; sulcata, 239
Calluna vulgaris var. depressa,* 13
Canthium viridissimum,* 7
Cape Flora, Protection of, 182
Capparis, Jamaican species, 142; baducca, 142; cynophallophora, 142; ferruginea, 143; flexuosa, 144; indica,* 143; longifolia, 144
Cardot, Jules, 312
Carex atrofusca, 168
Carum verticillatum, 310
Cassipourea eketensis,* 3
Cavers, F., Molisch's 'Mikrochemie' (rev.), 19; Czapek's 'Biochemie' (rev.), 47
Cephælis Jenmanii,* 313; Kaiteurensis,* 313; Talbotii,* 8; thibaudiæfolia,* 313
Channel Island Plants, 327
Cheiranthus, monstrous form of, 265
Chenopodium leptophyllum, 275
Chimaphila domingensis,* 169
Chittenden, F. J., The Rogue Wallflower, 265
Chodat's 'Flore Cryptogamique Suisse' (rev.), 277
Chondrus, Japanese, 326
Christensen's 'Index Filicum,' 88
Christy, Miller, Coiling of Arum spathes, 258
Clerodendron eketensis,* 32
Codium divaricatum, 324, var. inflectum,* 324
Coffea eketensis,* 8
Colloderma oculatum, 101
Conyza decurrens, 150
Cook's (M. T.) 'Diseases of Tropical Plants' (rev.), 83
Cooper, J. E., Middlesex Casuals, 127
Corema, new fossil (C. intermedia) (t. 531), 113
Cotton, A. D., Distribution of British Algæ, 35
COUNTY RECORDS:—
  Anglesea, 251
  Cambridge, 46, 107
  Cumberland, 18
  Devon, 77, 106, 107, 185, 255, 276, 310
  Dorset, 40, 277, 280, 310, 340
  Durham, 18, 137
  Essex, 280
  Gloucester, 277
  Hants, 184, 245, 277
  Hertford, 153
  Kent, 19
  Lancaster, 18, 217, 257
  Lincoln, 126
  Man, Isle of, 144, 170, 185, 213
  Middlesex, 111, 127, 256
  Norfolk, 108, 136, 270
  Somerset, 24, 153, 220, 277, 311, 340
  Suffolk, 72, 113
  Surrey, 250
  Sussex, 105, 311
  Westmoreland, 137
  Worcester, 306
  York, 22
  [*See also* Distribution of British Algæ, 35; Notes on British Plants, 57, 114, 196; Notes on Focke's 'Rubi,' 178, 202; Azolla, 209; Watson Exchange Club, 271; Alchemilla forms, 281.]
'Crete, Camping in,' 23
Cribraria purpurea, 102; rubiginosa, 102
Crotolaria, 224
Crowfoot's 'Desert Flowers,' 256
Cuviera calycosa,* 7
Cyclocotyla, 28; oligosperma,* 28
Czapek's 'Biochemie' (rev.), 47

Daltonia novæ-zelandiæ, 123
De Vries's 'Gruppenweise Artbildung' (rev.), 54
De Wildeman's 'Flore du Katanga' (rev.), 219
Decadia, 146

Declieuxia peruviana,* 225; roraimensis,* 226
Delphinium peregrinum, 10
Dicalyx, 148
Dicliptera Talbotii,* 32
Dictydium cancellatum, 103
Diderma radiatum, 100
Didymium Wilczekii, 101
Diospyros longipes,* 338
Discinella minutissima,* 216
Dixon, H. N., Miscellanea Bryologica, 119
Dorset Plants, 40
Druce's 'Morisonian Herbarium' (rev.), 155; his Exchange Club Report, 158
Dubois' 'La Vie et la Lumière' 255
Dümmer, R. A., Bertya neglecta,* 151; Arctotis Scullyi,* 152; Three Conifers, 236

Elfving's 'Die Flechtengonidien' (rev.), 189
Erigeron mucronatus, 274
Erlangea Rogersii,* 333; schebellensis,* 333
Erodium, 273
Ethulia Scheffleri,* 89
Euphorbia gibraltarica,* 13, 47
Evolution, Floral, 110, 192
Ewing, Peter † (portr.), 296
Extermination of Plants, 112

Falkland Island Cryptogams, 343
Farmer, J. B., Isle of Man Hepatics, 144
Fawcett, W., Annona prætermissa,* 74; Jamaican Species of Capparis, 142; Rosa sinica, 184; his 'Banana' (rev.), 253
Focke's 'Rubi,' 178, 202
Fockea Monroi,* 149
Fossombronia Husnoti var. anglica,* 106
Fritsch's 'Study of Plants' (rev.), 311
Fumarias, Channel Island, 327

Gabunia Dorotheæ,* 25
Gaertnera eketensis,* 30
Gardenia Cunliffeæ,* 5
Gardiner, William, 56
Gaultheria Shallon, 250
Geranium purpureum, 330
Gibraltar, Flora of, 10, 47, and Supplement
Gilbert, E. G., Symphytum, 19
Gnetum, 223
Godfery, M. J., New hybrid Ophrys, 271
Goode, G., An Adventitious Flora, 46
Goode, Henry, 250
Gordon, R. J., 75, 224
Grafe's 'Ernährungsphysiologisches Praktikum' (rev.), 340
Green, J. R.,† 223
Grove's (W. B.) 'British Rust Fungi' (rev.), 51

Habenaria montana, 310
Haberlandt's 'Physiological Plant Anatomy' (rev)., 217
Hamer, A. H., Protection of Cape Flora, 183
Hanbury, F. J., Linaria arenaria, 276
Hartley, J. W., Manx Flora, 170, 213
Hemitrichia abietina, 103; leiotricha, 103
Henslow, G., The Origin of Species, 177; Evolution, 192
Hepatics, New British, 106; Isle of Man, 144, 185
Herniaria ciliata, 332; var. angustifolia, 331–2; glabra, 341
Hieracia, Perthshire, 165
Hieracium maculatum, 272
Hiern, W. P., Diospyros longipes,* 338
Holmes, E. M., J. A. Martindale (portr.), 241; Ptilota plumosa and Henry Goode, 250
Horwood's (A. R.) 'Plant Life' (rev.), 78
Howard's 'Zoocécidies,' 23
Hoya lactea,* 293; pachypus,* 294; sogerensis,* 293
Hydrilla in England (t. 534), 257
Hypericum Desetangsii, 18; humifusum var. decumbens, 329; linariæfolium var. approximatum, 330

'Index Kewensis' (rev.), 50
Index species in a Flora, 124
International Botanical Congress, 1915, 56
Isle of Man Hepatics, 144

Jackson, A. B., Seligeria paucifolia, 277; his 'Trees of Albury Park,' 24
Jackson, B. D., Orta's 'Simples of India' (rev.), 21

Japanese Algæ, 314
Johnson's (W. H.) 'Tropical Agriculture,' 23
Jost's 'Plant Physiology' (rev.), 157
Journal of Genetics, 112, 223, 344
Juncus tenuis, 340

Kew, plants at, 42, 77
Kigelia Spragueana,* 31
Kolkwitz's 'Pflanzenphysiologie' (rev.), 109

Lammermann's 'Süsswasser-flora Deutschlands' (rev.), 254
Lamproderma violaceum var. Carestiæ, 102
Larter, C. E., Ptilota plumosa, 77
Lecanora isidioides, 184
Lees's 'Vegetation of Yorkshire,' 22
Lepidoderma Carestianum, 101
Lepidostrobus, 280
Leucojum vernum, 153
Licea minima, 103; pusilla, 103
Linaria arenaria, 276, 310
Lindenia acuminatissima,* 227; radicans,* 226
Linnean Society, 136, 159, 160, 175, 177, 191, 223, 343; Journal, 224, 312; Proceedings, 344; Transactions, 88, 280
Linton's Supplement to British Rubi, 87
Lister, G., Swiss Mycetozoa, 98
Loranthus Braunii var. Talbotii,* 34; Talbotiorum, 34
Lotsy, J. P., The Origin of Species, 175
Lowson's 'Text-book' (Indian edition) (rev.), 342

Macdonald's (W.) 'Makers of Modern Agriculture,' 190
Mæsa rubens,* 291
Manx Plants, 144, 170, 185, 213
Marloth's 'Flora of S. Africa' (rev.), 84
Marsh, A. J., Azolla in Britain, 209
Marshall, E. S., Somerset Plants, 153; Mid-Perth Plants, 164; Melampyrum pratense, 140, 167; his 'Supplement to Flora of Somerset (rev.), 220
Martindale, J. A.,† (portr.), 241
Massee's 'Mildews, Rusts, and Smuts' (rev.), 81
Mayfield, A., Moss Flora of Suffolk, 72
Melvill, J. C., Ptilota plumosa, 107
Mesozoic Plants, 278
Middlesex Casuals, 127
Miller's 'Abridgement,' 217
Miquel's 'Plantæ Junghuhnianæ,' 44
Miscellanea Bryologica, 119
Molisch's 'Mikrochemie' (rev.), 19
Moore, A. H., Spilanthes iolepis,* 263
Moore, Spencer, Nigerian Gamopetalæ, 4, 25; Apetalæ, 33; Marloth's 'Flora of S. Africa' (rev.), 84; Wilson's 'Naturalist in W. China' (rev.), 85; Alabastra Diversa, 89, 146, 289, 333; 'Flore du Katanga' (rev.), 219; 'Sabicea' (rev.), 251; Compositæ from Peru, 263
Morton's (F.) Phyllitis, 192
Moss, C. E., Notes on British Plants, 57, 114, 196; Vaccinium Oxycoccos, 311; Wernham's 'Floral Evolution' (rev.), 110; his 'Cambridge British Flora' (rev.), 131
Moss Flora of Suffolk, 72
Mosses, H. N. Dixon, on, 119; Abor, 255; Indian, 255
Muschleria* angolensis* (t. 530), 89
Mussændas of Madagascar, 64; arachnocarpa,* 69; arcuata, 65; asperula,* 67; citrifolia, 72; discolor, 72; erectiloba,* 67, var. scabrella,* 68; eriantha, 71; fusco-pilosa, 70; Humblotii,* 70; hymenopogonoides, 68; Landia, 66; mauritiensis,* 66; monantha,* 70; Pervillei,* 67; pilosa, 71; punctata, 68; ramosissima,* 69; scabridior,* 71; Stadmannii, 66; trichophlebia, 66; vestita, 71, var. macrocalyx,* 71
Mycetozoa, Swiss, 98

Narita Seiitchi, Algæ Japoniæ, 324
Neosabicea* Lehmannii* (t. 533), 225
Nicholson's (W. A.) 'Flora of Norfolk' (rev.), 108
Nicholson, W. E., New British Hepatics, 106
Nigerian Plants, 1, 25
Nomenclature, 50, 63, 88, 115, 119, 132, 156, 197, 224
Norfolk, Flora of (rev.), 108

OBITUARY:—
Ewing, Peter (portr.), 296

  Green, Joseph Reynolds, 223
  Martindale, James Anthony (portr.), 241
  Parsons, Henry Franklin, 24
  Van Tieghem, Philippe, 192
  Wallace, Alfred Russel, 15
  West, William (portr.), 161
Œnothera, 54, 223
Ophrys × olbiensis,* 271
Ophryses, Hybrid, 136
Orchis hircina, 311
Origin of Species, 175, 177
Orkney Flora (rev.), 222
Orta's 'Simples and Drugs of India' (rev.), 21

Papuan Plants, 289
Parsons, H. F.,* 24, 280
Pascher's 'Süsswasser-flora Deutschlands' (rev.), 88, 254
Paulsen, R., Lecanora isidioides, 184
Pearson on Gnetum, 223
Perichæna vermicularis, 104
Perrin's (Mrs.) 'British Flowering Plants' (rev.), 134
Perthshire Plants, 164
Peruvian Compositæ, 263
Petre, the eighth Lord, 344
Photobacterium, 256
Phyllitis, 192
Physarum fulvum, 100
Pillansia, 159
Pleioceras glaberrima,* 26; oblonga,* 27; Stapfiana,* 27; Talbotii,* 26
Poa remotiflora (t. 532), 193
Podocarpus Motleyi,* 240
Polycarpon tetraphyllum var. diphyllum, 329
Polyporus squamosus, 107
Price, S. R., Polyporus squamosus, 107
Primroses, extermination of, 111
Protection of Plants, 136; at Cape, 182
Prototrichia metallica, 104
Psychotria astreliantha,* 316; bocqueronensis,* 315; Everardii,* 316; hemicephælis,* 314; oblita,* 314; paludinundata,* 315; plocamipes,* 316; transiens,* 314
Pterocaulon decurrens,* 151
Ptilota plumosa, 77, 107, 250
Puccinia Smyrnii, 185
Pugsley, H. W., Dorset Plants, 40; Channel Island Plants, 328
Pyrola rotundifolia, 274
Ramsbottom, J., Grove's 'British Rust Fungi' (rev.), 51; Massee's 'Mildews, Rusts and Smuts' (rev.), 81; Kolkwitz's 'Pflanzenphysiologie' (rev.), 109; Puccinia Smyrnii, 185; Trans. Brit. Mycological Soc. (rev.), 187; Discinella minutissima,* 215; Haberlandt's 'Plant Anatomy' (rev.), 217; Fritsch and Salisbury's 'Study of Plants' (rev.), 311
Ramsbottom, J. K., 'Cyclopedia of Horticulture' (rev.), 252
Randia Cunliffeæ,* 6; Galtonii,* 6
Ranunculus Baudotii, 114; obtusiflorus,* 114; ophioglossifolius, 277
Reichenbach's Herbarium, 280
Reid, C., Armeria arctica, 214; and E. M., New Fossil Corema (t. 531), 113
Remijia Trianæ,* 225
Rendle, A. B., Talbot's 'Nigerian Plants,' 1; De Vries's 'Gruppenweise Artbildung' (rev.), 54; Annona prætermissa,* 74; Jamaican Species of Capparis, 142; Fawcett's 'Banana' (rev.), 253; Report of Dept. of Botany, 307
Reviews:—
  Mikrochemie der Pflanzen, H. Molisch, 19
  Colloquies on the Simples and Drugs of India, Garcia da Orta, 21
  Index Kewensis Supplementum Quartum, 50
  The British Rust Fungi, W. B. Grove, 51
  Gruppenweise Artbildung, H. de Vries, 54
  Plant-Life in the British Isles, A. R. Horwood, 78
  Mildews, Rusts, and Smuts, G. Massee, 81
  Fungi which cause Plant Diseases, F. L. Stevens, 83
  Diseases of Tropical Plants, M. T. Cook, 83
  Flora of Norfolk, W. A. Nicholson, 108
  Pflanzenphysiologie, R. Kolkwitz, 109
  Icones Orchidearum Austro-Africanarum, H. Bolus, 110
  Floral Evolution, H. F. Wenham, 110
  Cambridge British Flora, C. E.

  Moss and E. W. Hunnybun, 131
  British Flowering Plants, G. S. Boulger and Mrs. Henry Perrin, 134
  Irritability of Plants, T. C. Bose, 153
  Account of Morisonian Herbarium, S. H. Vines and G. C. Druce, 155
  Plant Physiology, L. Jost, 157
  Flowering Plants of Riviera, H. S. Thompson, 185
  Genera of British Plants, H. G. Carter, 186
  Trans. British Mycological Society, 187
  Die Stoffwanderung, N. Swart, 188
  Die Flechtengonidien, F. Elfving, 189
  Physiological Plant Anatomy, G. Haberlandt, 217
  Flore du Katanga, E. de Wildeman, 219
  Supplement to Flora of Somerset, E. S. Marshall, 220
  Flora Orcadensis, M. Spence, 222
  Sabicea, H. F. Wernham, 251
  Cyclopedia of Horticulture, 252
  The Banana, W. Fawcett, 253
  Süsswasser-flora Deutschlands, 254
  Flore Cryptogamique Suisse, R. Chodat, 277
  Mesozoic Plants in British Museum, M. C. Stopes, 278
  Study of Plants, F. E. Fritsch and E. J. Salisbury, 311
  Ernährungsphysiologisches Praktikum, V. Grafe, 340
  Plants and their Uses, F. L. Sargent, 341
  Lowson's Text-book, Mrs. Willis, 342
Rhamphogyne* rhynchocarpa* (t. 530), 146
Riccia commutata, 105
Riddelsdell, H. J., Gaultheria Shallon, 250; Apium graveolens, 340
Ridley, H. N., New Papuan Plants, 289; on New Guinea Botany, 160
'Riviera, Flowering Plants of' (rev.), 185
Roebuck, W. D., William West, 161
Rogers, W. M., Focke's Rubi, 178, 202
Rogue Wallflower, 265
Romulea Columnæ, 46; parviflora,* 46, 217
Rosa sinica, 184
Rubi, Focke's, 178, 202
Rubiaceæ, Tropical American, 225, 313
Ruellia Forbesii,* 294
Rynchospora glauca var. pauciseta,* 14

Sabicea (rev.), 251
Sagina nivalis, 273; saginoides, 57
Salisbury's 'Study of Plants' (rev.), 311
Salmon, C. E., Hypericum Desetangsii, 18; Cumberland and Durham Plants, 18; Teesdale Plants, 137; Poa remotiflora (t. 532), 193; Alchemilla acutidens, 287, var. alpestriformis,* 287
Salvia Verbenaca var. oblongifolia, 330
Sargent's (F. R.), 'Plants and their Uses' (rev.), 341
Schefflera bractescens,* 290; Forbesii,* 290
Schizoglossum Eylesii,* 149
Scilly Plants, 19
Scottish Plants, 107, 124, 164, 216, 222, 227, 256, 310
Sedum Winkleri,* 12
Seligeria paucifolia, 277
Sematophyllum acutirameum, 119
Senecio spathulæfolius, 138
Sex Character in Plants, 247
Silene rigida, 339
Sisymbrium altissimum, 273
Skene's 'Wild Flowers,' 112
Smith, A. L., F. L. Stevens and M. T. Cook on Fungi and Plant Disease (rev.), 83; Elfving's 'Die Flechtengonidien' (rev.), 189
Soyauxia Talbotii, 4
Spartina Townsendii, 245
Spence's 'Flora Orcadensis' (rev.), 222
Spergularia atheniensis, 328
Spilanthes iolepis,* 263
Stapf on Spartina Townsendii, 245; on British Flora, 256
Stevens's (F. L.), 'Fungi Causing Plant Disease' (rev.), 83
Stokes, Jonathan, and his Commentaries, 299, 313

Stopes's 'Mesozoic Plants' (rev.), 278
Stratton, F., Valerianella eriocarpa, 107
Strephonema, 3
Strychnos eketensis,* 29
Suffolk Mosses, 72
Swiss Mycetozoa, 98
Swynnerton on bird-fertilization, 159
Symphytum, revision of, 55; asperinum, 19; peregrinum, 19, 274
Symplocos cochinchinensis,* 148

Talbot, Mr. and Mrs., Nigerian Plants, 1
Talbotiella* eketensis* (t. 529), 2
Tarenna eketensis,* 4
Teesdale Plants, 137
Thomas, E. N., Bose's 'Irritability of Plants' (rev.), 153
Thomas, H. H., 'Mesozoic Plants' (rev.), 278
Thompson, H. S., Early Season, 153; his 'Flowering Plants of Riviera' (rev.), 185
Thompson's 'Botany Displayed,' 303
Thuja orientalis var. mexicana,* 236
Thunbergia Talbotiæ,* 31
Tobler's 'Vegetationsbilder von Kilimandscharo' 256
Travis, W. G., Apera interrupta, 217
Trevor-Battye's 'Camping in Crete,' 23
Trixis hexantha,* 264
Tylophora smilacina,* 29
Tylostemon confertus,* 33

Umbilicus citrinus,* 123
Urophyllum eketense,* 4
Utricularia in Britain, 9

Vaccinium Oxycoccos, 277, 311
Valerianella eriocarpa, 107
Van Tieghem, Philippe,† 192
Vernonia, African, 99, 333; anandrioides,* 96; campicola,* 97; castellana,* 95; chlorolepis, 92; concinna,* 93; Duemmeri,* 91; fontinalis,* 90; Hierniana,* 335; lafukensis,* 94; Migeodi var. leptolepis,* 335; oocephala var. angustifolia,* 334; orgyalis,* 334; paludigena,* 91; subaphylla,* 336; vallicola,* 95; Yatesii,* 97
Veronica hybrida, 275; meduanensis, 255
Vines's 'Morisonian Herbarium' (rev.), 155
Viola hybrid, 273
Voacanga eketensis,* 25; glaberrima,* 25

Wainwright, T., Linaria arenaria, 310
Wallace, A. R.,† 15
Wallflower, Rogue, 265
Watson Exchange Club Report, 271
Wedelia Forbesii,* 264
Wernham, H. F., Nigerian Polypetalæ, 425; Mussændas of Madagascar, 64; Carter's 'Genera of British Plants' (rev.), 185; Swart's 'Die Stoffwanderung' (rev), 188; his 'Floral Evolution' (rev.), 110; Tropical American Rubiaceæ, 225, 313; his 'Sabicea' (rev.), 251
West, G. S., 'Süsswasser-flora Deutschlands' (rev), 254; 'Flore Cryptogamique Suisse' (rev.), 277
West, William † (portr.), 161; his 'Ecological Notes,' 191
Wheldon, J. A., Manx Plants, 170, 185, 213; Alpine Vegetation on Ben-y-Gloe, 227, 277
White, J. W., Scilly Plants, 19; Carum verticillatum, 310; Juncus tenuis, 340
Williams, F. N., Miller's 'Abridgement,' 217; Silene rigida, 339
Willis's Indian edition of Lowson's Textbook (rev.), 342
Wilson, A., Alpine Vegetation on Ben-y-Gloe, 227, 277
Wilson, W., Aberdeenshire Plants, 167
Wilson's (E. H.) 'Naturalist in Western China' (rev.), 85
Wiltshear, F. G., Miquel's 'Plantæ Junghuhnianæ,' 44; the Bradley Bibliography, 55
Withering, W., 300
Wolley-Dod, A. H., Gibraltar Plants, 10, 47; Flora of Gibraltar, Supplement
Woodruffe-Peacock, E. A., Index Species, 124

Zoocécidies des Plantes, 23

ERRATA.

P. 13, l. 11 from top, omit "N. E. Br."
P. 43, l. 12 from bottom, for "200,000" read "600." See p. 77.
P. 56, l. 19 from bottom, for "Mr." read "Mrs."
P. 72, l. 8 from bottom, "not" should be inserted before "hitherto."
P. 86, l. 14 from bottom, for "of Cambridge (not Dublin, Mr. Wilson!)" read "of Dublin, formerly of Cambridge."
P. 91, l. 17 from top, for "Zinga" read "Jinga."
P. 133, l. 27 from bottom, for "arrayed" read "arranged."
P. 153, l. 6 from bottom, for "Tajadis" read "Jagadis."
Pp. 228, 229, 233, 235, *passim*, for "Moss" read "Smith."
P. 293, l. 16 from top, for "sine no." read "nos. 500, 691, 837*b*, 925 in part."

PRINTED BY WEST, NEWMAN AND CO., HATTON GARDEN, LONDON, E.C.

A FLORA OF GIBRALTAR AND THE NEIGHBOURHOOD.

By Major A. H. WOLLEY-DOD.

Introduction.

During two visits to Gibraltar, from November to June inclusive, in 1911 to 1913, I was able to devote practically the whole of my time to the study of the botany of the Rock and the adjacent portion of Spain, which proves to be considerably richer than is indicated by the Floras hitherto published. That finality is not nearly reached is shown by the number of unrecorded species that may be found in any excursion to the less easily accessible localities and, indeed, even in those which have been most worked.

The limits covered are not very well defined, the ground searched being very irregular in outline; it may be roughly stated as including all the neighbourhood of Gibraltar, San Roque, and Algeciras, as far north as a line drawn from La Tunara on the Eastern Beach to Malaga Gardens, thence to the gap between the Sierra Lorca and Alcadeza Crags, and on to the Almoraima Convent. The country between the Guadarranque and Palmones Rivers has been almost unexplored by me, except the strip between the railway and the sea. South of the Palmones River I have explored the Waterfall Valley and some of the adjacent valleys and slopes, as well as much of the ground about Algeciras, chiefly to the north, with two excursions to Carnero Point. In general, the region covered by my Flora may be regarded as that which can be reached from Gibraltar or Algeciras in a day's walk, assisted in one direction by the railway; but by making fuller use of the railway than I did, a considerably greater area of country about and beyond Jimena might be embraced. Much of this ground has been worked by former botanists, but, to judge from the records, it appears that little attention has been given to the Alcadeza and Cork Wood Crags, or to the less accessible parts of the woods themselves; also to the marshes between the rivers, and to the shore and hills about Carnero Point.

Geology and Topography.

The region covered by the Flora lies between 39° 5′ and 36° 15′ N. latitude, and 5° 20′ to 5° 30′ W. longitude, and is for the most part hilly. The lower rock formation of the Spanish portion is Jurassic limestone, with an overlying compact yellowish sandstone forming the Algeciras Mountains, which rise to 2500 ft.

or more, the Queen of Spain's Chair, or Sierra Carbonera, 978 ft., and the Sierra Lorca and Alcadeza Crags, of lower elevation. The surface soil is very largely a compact stony gravel, with considerable beds of stiff clay, but it becomes sandy in many places, and there are large stretches of sand near the coast. The surface, especially on the hills, is intersected by numerous watercourses, but excepting the Rivers Guadarranque and Palmones and some of the streams from the Algeciras Mountains, they only run during the rainy season, and in very dry years even the larger streams dry up. An extensive marsh, partly saline, exists at Palmones and Guadacorte, and perennial wells are numerous in the sandy ground cultivated for vegetables near Linea and Palmones.

Spain is connected with Gibraltar by a belt of sand about two miles wide, extending from Gibraltar Bay to the Mediterranean. The town of Linea lies across this, separating the Spanish portion of the sand from the Neutral Ground. In the former region the sand is undulating and very bare of vegetation, except where it is irrigated for cultivation, but the Neutral Ground is flat, hardly rising 10 ft. above the sea, and is far more fertile.

The Rock itself is of secondary limestone, rising vertically to a height of 1350 ft. from the North Front (the highest point being 1439 ft., about 1¼ mile further south), and sloping steeply on its western face, at the foot of which lies the town. The limestone is full of hollows and pot-holes, and several extensive caves exist; the hollows are filled with a fertile soil, but from the nature of the rock they very soon get dry. There are no permanent watercourses, nor even temporary ones, except during the actual fall of heavy rain, and there are no marshes. Here and there on the lower portions, as about the Alameda and Windmill Hill, a reddish sand appears, and on the eastern side, which in its upper portion is precipitous, lies a steep slope of blown sea sand, which supports a scanty but characteristic vegetation.

CLIMATE.

The mean maximum temperature in July and August, the hottest months of the year, is 84°, the mean minimum then being 75°, while maxima over 90° are not infrequent.* In January and February, the coldest months, the means are 63° and 55° respectively. Frost very rarely occurs, and only on the higher or more exposed parts, though records exist of ice an inch thick on shallow pools, which, however, soon disappears in the sun.

The annual rainfall averages 28·5 in., but varies from 15 in. to 60 in. or even more. Of this the bulk falls between November and April, the months of June to August rarely receiving a total of 1 in. Kelaart records twenty-five consecutive years when no rain fell in July. The effect of this climate is that, botanically speaking, spring begins in November, the most floriferous months being March to May, after which all the annuals are dried up; in

---

* The mean minima seem too high, but I have not been able to check them by official records.

July to October comparatively few species have their normal flowering period, though quite a considerable number linger on till November. But the number of succulent and really heat-resisting species is few, and in the summer the whole country assumes an arid and burnt-up aspect, and with few exceptions, flowering plants must then be sought in shady spots and water-courses.

Historical Sketch of the Botany.

When I undertook this work, I had no intention of doing more than cataloguing the species already enumerated in the local Floras, with the addition of those found by myself; but since the body of the book went to press, I found more leisure for studying the records of the earlier botanists, and have been struck by the number of species recorded by them which have been disregarded by later writers, and consequently not embodied by me. At the same time it must be borne in mind that few botanists have drawn any hard and fast line between the flora of the Rock proper and that of the surrounding country, and the difficulty of assigning to the North Front its proper records is increased by the ambiguous references to the Neutral Ground. It is also clear that modern writers have incorrectly referred many species to the Rock which were never collected there, nor were even stated by their recorders to have been found there. This is especially the case with Colmeiro, who assigns nearly all Kelaart's records for the neighbourhood, as well as many of those of the older collectors, to "Gibraltar," including the very untrustworthy and unintelligible ones of Talbot (*i.e.* James), which are dealt with later. Hence I am unable to make use of the citations of this author, which contain other obvious errors.

The Rock.

The following is a list of the principal collectors and their records for the Rock, compiled from their own writings and from such of the citations of Willkomm and Lange, Kelaart, Debeaux and Perez Lara as appear likely to be correct. A few records are assigned to Lamarck, Cavanilles, Jussieu, and others, even to Linnæus: I do not think any of these ever visited the Rock, but cite specimens they have seen.

I have given the lists as I find them, merely substituting, where possible, modern for ancient nomenclature, though in doing so there may be danger of misinterpreting synonymy. I have not, however, repeated in later lists species recorded in earlier ones, except in cases where they tend to confirm otherwise doubtful records. It will be apparent that many mistakes in naming have been made, or that many species have disappeared from the Rock. I strongly incline to the former view, and have consequently made many exclusions, shown by square brackets. Some of these are of plants known to be found only on the Neutral Ground, which would doubtless have been recorded as "Gibraltar." A few of the records serve to corroborate species I had already excluded, while others, shown in round brackets, are still doubtful, and where mentioned in the Flora are there marked "?" These corroborated species, if recorded by two collectors, and a few which otherwise appear to be probably correct, have been accepted, but the number excluded, although definitely stated to have been gathered on the Rock, is still large.

CHARLES DE L'ECLUSE, or CLUSIUS, in Rar. Stirp. Hisp. Obs. Hist. (1576) and Rar. Plant. Hist. (1601), cites the following species for Calpe: there is another Calpe near Hifac in Valentia, but with the exception perhaps of *Crucianella maritima*, all the records here given appear to be for Gibraltar; they were collected about 1565:—

Cytisus triflorus, *Crucianella maritima*? *Diotis maritima*, *Lavandula dentata*, *Teucrium fruticans*, *Romulea Clusiana*, *Narcissus niveus*. The last species is given by Clusius as *N. totus albus alter*, i. e. *N. polyanthus*, but Kelaart supposes, no doubt rightly, that *N. niveus* is meant.

PITTON DE TOURNEFORT (1676–90) collected in Spain. A MS. catalogue of his species is among the Banksian MSS. in the National Herbarium; this contains a list of seventy-five species gathered on the Rock, chiefly between the summit and Europa, three of which had already been recorded by Clusius. The list is in pre-Linnean nomenclature, and only the following are easily identifiable. The list is headed "*In Monte Calpe, præsertim eundo ad virginem Europæ, tum in vertice*," which seems incontrovertibly definite, yet there are eleven species which I am compelled to exclude as unconfirmed or improbable, and those from only two-thirds of the list, which is all I can interpret:—

Clematis cirrhosa, [*Helleborus fœtidus*], *Lobularia maritima*, *Ruta chalepensis*, *Pistacia Terebinthus*, *Anagyris fœtida*, *Spartium junceum*, *S. spinosum* (probably *Calycotome villosa*), [*Cytisus hirsutus*] (Willk. Prodr. iii. p. 454, thinks *Argyrolobium argenteum* is meant), *C. linifolius*, [*Anthyllis Barba-Jovis*], [*Biserrula pelecinus*], *Myrtus communis*, [*Medicago circinnata*], *Petroselinum peregrinum*, *Bupleurum fruticosum*, *Crithmum maritimum*, *Thapsia garganica*, *Ferula tingitana*, *Smyrnium Olusatrum*, *Fedia graciliflora*, *Asteriscus maritimus*, *Kentrophyllum arborescens*, [*Carthamus corymbosus*], [*Stæhelina dubia*], [*S. arborescens*], [*Arbutus Unedo*], *Cerinthe major*, *Vinca major*, [*V. minor*] (probably both were *V. media*), *Scrophularia sambucifolia*, *S. frutescens*, *Chænarrhinum villosum*, *Lavandula Stœchas*, *L. multifida*, *Calamintha menthæfolia*, *Phlomis fruticosa*, *Thymus hirtus*, *Acanthus mollis*, [*Laurus nobilis*], (*Osyris alba*), *Aristolochia bætica*, *Theligonum Cynocrambe*, *Arisarum vulgare*, *Iris Sisyrinchium*, *Asparagus albus*, *Asphodelus fistulosus*, *A. microcarpus*.

Lieut.-Col. T. JAMES, Royal Artillery, in his *History of the Herculean Straits*, p. 338 (1771), gives a list of English names of about three hundred species which grow or are cultivated on the Rock, stating whether they grow on the front, back, top, or in gardens. It is not always easy to identify these, many of the names having been applied to more than one species. Colmeiro gives what he supposed to be their Latin equivalents, and attributes them to Talbot, *i.e.* Sir J. Talbot Dillon, who, without acknowledgement, copied James's list into his *Travels through Spain* (1780). It does not appear that Dillon ever went to Gibraltar. Though many of the species are undoubtedly natives of the Rock, their doubtful associations and the difficulty of ascertaining precisely what James's names meant, render the whole list untrustworthy, and I do not propose to establish any records upon it. It is too long to reproduce here, but forms an interesting study.

L. Née collected in Andalusia in 1780–82. I am not sure that he ever visited the Rock, but the following records are assigned to him for Gibraltar:—

Delphinium pentagynum, *Lotus cytisoides*, (*Thapsia decussata*), *Notochlæna vellea.*

Ayala's *History of Gibraltar* (1782) gives about thirty names in popular Spanish nomenclature, some cultivated and others mentioned only by the generic name. The following are the only ones at all definitely indicated:—

Myrtus communis, *Umbilicus pendulinus*, *Hedera Helix*, *Convolvulus Soldanella*, [*Cynanchum monspeliacum*], *Rosmarinus officinalis*, *Euphorbia dendroides* (probably *E. Characias*), *E. Paralias*, [*E. Myrtites* (sic)], *Scilla hemisphærica*, *Allium roseum* (ex Colm.).

Francis Masson collected in Gibraltar, Spain, and Portugal in 1783. A MS. list of his specimens in the Banksian herbarium is in the National Herbarium. The following are marked "Gibraltar," omitting two already recorded. The number of exclusions is disconcertingly large, and may be partly due, as with Tournefort's list, to a misinterpretation of some of the names, or to errors on Masson's part. It is more than likely also that his "Gibraltar" meant the whole neighbourhood:—

Delphinium peregrinum, *Papaver hybridum*, *Cistus albidus*, [*C. anglicus*], [*Halimium Libanotis*], *Reseda alba*, [*Eudyanthe læta*], *Silene littorea*! (recorded as *Saponaria ocymoides*), *Cerastium gibraltaricum*, *Ruta graveolens* (doubtless *R. chalepensis*), *Cratægus Oxyacantha* (i. e. *C. monogyna*), [*Chærophyllum*, sp.], *Torilis nodosa*, *Orlaya maritima*, *Elæoselinum fœtidum*! [*Pterocephalus Broussonetii*], *Campanula mollis*, *C. Rapunculus*, *Thymus diffusus*! [*Satureia Juliana*], [*Sideritis hyssopifolia*] (Willk. Prodr. ii. p. 454, thinks this may be a form of *S. scordioides*), [*S. montana*], *Anagallis linifolia*, [*Armeria latifolia*], (*Statice cordata*) (perhaps *S. virgata*), *Plantago Lagopus*, [*Panicum junceum*], *Spartina stricta*, *Agrostis panicea* (probably *Polypogon monspeliensis*), *Lagurus ovatus*, *Corynephorus canescens*, *Cutandia maritima*, *Melica ciliata*! *Dactylis glomerata*, *Vulpia geniculata*! *V. Alopecurus*! *Agropyron junceum*, *Brachypodium distachyum*, *Lobium perenne.*

The Abbé Pourret collected in Spain about 1790. The following are among his records for "Gibraltar," but perhaps not for the Rock itself:—

Erucastrum incanum, *Rapistrum rugosum*, *Polygala rupestris*, *Linum maritimum*, *L. strictum*, *Medicago hispida*, (*Daucus crinitus*), [*Hippomarathrum pterochlænum*], *Centranthus macrosiphon*, [*Datura Metel*], *Euphorbia Chamæsyce*, *Asplenium Trichomanes*.

P. M. A. Broussonet collected in South Spain from about 1793. Some of his specimens are dated 1821. The following are among his records from "Gibraltar"; the list would be more than doubled if all the species attributed to him by Colmeiro were included, which doubtless came from the neighbourhood. I have only included the grasses from Colmeiro:—

Fumaria capreolata, *Glaucium luteum*, *Matthiola tricuspidata*, *Biscutella apula*, (*Erodium Jacquinianum*), *Ononis variegata*, *Lotus edulis*, *L. ornithopodioides*, (*Ornithopus sativus*), *Scorpiurus sulcata*, [*Pimpinella villosa*], *Kundmannia sicula*, *Vaillantia muralis*, *Scabiosa stellata*, *Helichrysum rupestre*, (*Tragopogon porrifolius*), (*Campanula patula*) (specimen probably *C. Loeflingii*!), (*Linaria cirrhosa*!), (*L. triphylla*!), *L. tristis*, (*Lafuentea rotundifolia*), *Sideritis arborescens*, *Teucrium bœticum*, (*Thymelæa canescens*), [*Euphorbia Peplis*], [*E. exigua*], *Macrochloa tenacissima*, *Piptatherum miliaceum*, *Kœleria phleoides*, *Melica minuta*, *Serrafalcus hordeaceus*, *Bromus madritensis*!, *Lepturus incurvatus*.

The Abbé P. Durand collected between 1798 and 1807. I only trace the following records for Gibraltar:—

Delphinium Staphisagria, *Galium murale*, *Stachys circinnata*.

From Herb. Pavon, at Madrid, collected about 1800, the following species are cited, but no collector's name is given:—

(*Galium divaricatum*), *Euphorbia rupicola*.

To F. Haenseler (1761–1847), who collected about 1800, are credited:—

Retama monosperma, *Lotus arenarius*, *Alternanthera Achyrantha*.

S. de Rojas Clemente worked in Andalusia in 1802–4. His records, besides several already noted, and a considerable number attributed to him by Colmeiro, doubtless from the neighbourhood, are these:—

Bupleurum gibraltaricum, (*Nepeta reticulata*), (*Agrostis interrupta*), *Gymnogramma leptophylla*, *Scolopendrium Hemionitis*.

Sir Thomas Gage (1781–1820) collected about 1805, probably on the Rock. I have seen the following specimens (ex herb. Gouan):—

Campanula dichotoma! (*Linaria cirrhosa*)! *Anagallis linifolia*!

Von Spix and Von Martius, in *Travels in Brazil*, vol. i. p. 54, give a long list of plants seen by them in the neighbourhood of Gibraltar, where they arrived in May, 1817. At the end the following are mentioned as specially characteristic of the flora of the Rock itself. These lists have been overlooked by all later writers except Kelaart, who, however, makes only partial and incorrect use of that for the Rock:—

Cytisus candicans, *Vinca major* (doubtless *V. media* is meant), *Verbascum sinuatum*, [*Anarrhinum tenellum*] (Willk., Prodr. ii. p. 581, thinks *Linaria spuria* may be meant, but that is a very different species, also unrecorded; *Chænarrhinum villosum* is much more probable), [*Thymus patavinus*], *Phlomis purpurea*, *Sideritis subspinosa* (doubtless *S. scordioides*), *Prasium majus*, *Statice spathulata*, *S. sinuata*, *Daphne Gnidium*, *Chamærops humilis*. Kelaart wrongly interprets *Anarrhinum tenellum* as *A. bellidifolium*, and credits Von Martius's Rock list with *Lythrum Hyssopifolia*, [*Cachrys Pterochlæna*], [*Euphorbia Esula*], and [*E. segetalis*], which he only records from the neighbourhood.

C. Gaudichaud, in the Botany volume of the Voy. aut. du Monde, by L. Freycinet, gives a list of plants collected by himself in Gibraltar in 1817, which are now in herb. Delessert. He was only there for a very short time, and it is fairly certain that he only collected on the Rock. Many of the exclusions are recognisable as probable errors. This list has been unnoticed by all subsequent authors:—

Ranunculus bullatus, *Iberis gibraltarica*, [*Alyssum incanum*], *Silene inflata*, "with purple flowers," *Malva* spp., *Erodium Cicutarium*, *E. malacoides*, *Ruta graveolens* (probably *R. chalepensis*), *Lotus corniculatus*, [*Rubus saxatilis*, "espèce couchée, très petite, aux fol. lanceolées"], "un Crassule exotique aux feuilles ovales et arrondies au sommet" (probably *Sempervivum arboreum*), *Saxifraga* spp. (*S. globulifera*), *Mesembryanthemum* spp., *Scabiosa* spp., [*Erigeron canadensis*], *Calendula incana*, *C. tomentosa*, *C. suffruticosa*, [*Senecio erucifolius*], *S. vulgaris*, *Carduus* spp., [*Centaurea Jacea* v. *nigra*], *C. Calcitrapa*, [*Hypochæris radicata*], *Lactuca perennis* (probably *L. tenerrima*), *Olea europæa*, *Convolvulus althæoides*, *Borago officinalis*, *Echium creticum*, *Cynoglossum officinale* (probably *C. cheirifolium*), *C. pictum*, [*Verbascum Osbeckii*], *Antirrhinum majus*, *Thymus vulgaris*, *T. creticus*, *Coridothymus capitatus*, [*Salvia officinalis*], [*S. hispanica*], *S. horminum* (= *S. verbenaca*), *Phlomis fruticosa*, *Salsola Soda*, *Suæda fruticosa*, [*Rumex Acetosa*], [*R. Acetosella*], *R. bucephalophorus*, *Daphne* [*Laureola*] vel *Gnidium*, *Aristolochia Pistolochia* (perhaps *A. bætica*), *Ricinus communis*, *Parietaria lusitanica*, *Arum italicum*, *Chamærops humilis*, *Neottia spiralis* (doubtless *Spiranthes autumnalis*), *Asphodelus albus*, *Cyperus rotundus*, *Ceterach officinarum*, *Polypodium vulgare*.

H. W. Schott, who arrived in Gibraltar in October, 1817, has a list in *Isis*, 1818, p. 818, of plants he collected on the Rock, which, excluding previous records, is as follows. His herbarium is at Prague, and probably contains further records which have been cited by later writers:—

Rubus ulmifolius (sp. nov.), *Eryngium maritimum*, [*Galium gibraltaricum* (sp. nov.)], *Lactuca tenerrima*, [*Andryala nigricans*], *Echium plantagineum*, *Panicum repens*, *Andropogon distachyum*. Willkomm also credits him with (*Juniperus Oxycedrus*), *Serapias cordigera*, (*S. Lingua*), (*Orchis longicruris*), and *Ophrys* *aranifera*; but these are not in Schott's list, and may have been mis-cited for the Rock instead of from the neighbourhood.

P. SALZMANN collected in Spain in 1823. A considerable number of citations from his collections exists, many of them as "Gibraltar," but only four out of the following five not previously recorded are established for the Rock, *Spergularia fimbriata* having been more probably found on the Neutral Ground:—

(*Spergularia fimbriata*), *Ononis diffusa*, *Orobanche sanguinea*, *Piptatherum cærulescens*, *Scleropoa loliacea*.

PHILIP BARKER WEBB visited Gibraltar in 1827, and published about a dozen names in his *Iter Hispanicum* in 1838. A few other species are also referred to him, but only the following are new:—

Frankenia lævis, *Silene mollissima*, [*Pterospartum lasianthum*], *Lathyrus Clymenum*, *Vicia gracilis*, *Cyperus badius*.

RAMBUR worked at about the same time as Webb, but has few new records. Those which have been credited to the Rock are as follows:—

Oxalis cernua, *Sarothamus bæticus*, (*S. grandiflorus*).

Dr. K. FINDLAY collected in the neighbourhood about 1835. I have seen the following specimens of his labelled Gibraltar, but it is not stated that they were found on the Rock:—

(*Lathyrus angulatus*!), (*Centaurea polyacantha*!), *Anagallis linifolia*! (already recorded), (*Armeria macrophylla*!).

E. BOISSIER, in Voy. Bot. dans le Midi de l'Esp. (1837), gives seventy-seven species of his own collecting on the Rock. The following, which include a few cited elsewhere, have not been previously recorded. Those excluded belong to the Neutral Ground:—

Fumaria parviflora, *Malcolmia littorea*, *Succowia balearica*, *Brassica papillaris*, *Silene colorata*, *S. gibraltarica*, *Lavatera trimestris*, *Cytisus linifolius*, *Ononis reclinata*, *O. gibraltarica*, *Caucalis leptophylla*, *Daucus gingidium* (=*D. gummifer*), [*Cachrys Pterochlæna*], [*Pycnocomon rutæfolium*], *Centaurea sphærocephala*, *Hedypnois arenaria*, *Thrincia hispida*, *Jasione montana*, *Solanum nigrum*, *Linaria pedunculata*, *L. amethystea*, *Nepeta tuberosa*, *Teucrium Polium*, *Achyranthes argentea*, *Rumex thyrsoides*, *R. tingitanus*, *Ruppia maritima*! (as *R. rostellata*), *Ruscus Hypophyllum*, *Gastridium lendigerum*, *Ammophila arundinacea*, *Trisetum neglectum*.

The following species are attributed to Boissier or to Boissier and Reuter by Willkomm and Lange and others, doubtless from herbarium specimens, as they are not recorded from the Rock by those authors. I have seen Boissier's specimen of *Helichrysum decumbens*. The stations cited on Boissier and Reuter's labels are in most general terms and often misleading:—

Fumaria macrosepala, *Linum setaceum*, *Chætonychia cymosa*, *Helichrysum decumbens*! *Picridium vulgare*, *Andryala integrifolia*, *A. arenaria*, *Adiantum Capillus-Veneris*.

M. Willkomm published in Bot. Zeit. 1845 an account of his travels in that year through the south of Spain, which was translated in Ann. Nat. Hist. xvii. pp. 115, &c. He gives (on pp. 737–743 and 753, *l. c.*) the following new records for the Rock:—

Ranunculus flabellatus, Geranium rotundifolium, G. Robertianum, Erodium moschatum, E. laciniatum, Ruta bracteosa, Pistachia Lentiscus, Physanthyllis tetraphylla, Psoralea bituminosa, Hippocrepis multisiliquosa, Ecbalion Elaterium, Asteriscus spinosus, Pinardia coronaria, Phagnalon saxatile, Senecio minutus, Galactites tomentosa, Centaurea pullata, Picridium tingitanum, Æthcorrhiza bulbosa, Convolvulus siculus, Solanum villosum, S. Sodomæum, [*Chænarrhinum origanifolium*], (? *C. villosum*), *Veronica Cymbalaria, Emex spinosus, Osyris lanceolata, Mercurialis annua, Euphorbia helioscopia, Urtica membranacea, Ophrys lutea, Ornithogalum umbellatum, Smilax mauretanica.*

Willkomm gives a few further records in Prodr. Fl. Hisp., which was not published till 1870, and others are attributed to him by later writers, and though there is no doubt these were collected in 1845, I am not sure that they all came from the Rock. His earlier labels often leave it doubtful whether the specimens were gathered on the Rock or not. His records in the *Prodromus* would be more numerous but for the fact that he passes by many with the remark that they are common in South Spain:—

(*Malcolmia lacera*), *Fumana glutinosa,* [*Erodium Botrys*, the specimen is *E. laciniatum*!], *Retama monosperma, Vicia hybrida, Scandix Pecten-Veneris, Vaillantia hispida, Senecio foliosus, S. lividus, Sonchus tenerrimus, Andryala arenaria, Echium calycinum, Stachys hirta, Plantago Psyllium.*

Dr. C. M. Lemann collected at Gibraltar in 1840–1. Most of his records were communicated to Kelaart, but two or three are cited by others, and I have seen specimens at Kew of those indicated. Those not previously recorded are:—

Ranunculus blepharicarpus, Hesperis laciniata, Biscutella lævigata, Alsine tenuifolia, Spergula arvensis, Linum angustifolium, Lavatera cretica, Rhamnus Alaternus, Trifolium subterraneum, [*Astragalus depressus*], *Ornithopus compressus, Lathyrus setifolius*! *Thapsia villosa, Ferula communis* (probably *F. tingitana*), *Valerianella discoidea, Hyoseris scabra, Echium Pomponium,* (*Linaria viscosa*!), [*Orobanche reticulata*], *Micromeria græca, Thesium humile, Euphorbia serrata*!, *Ephedra fragilis, Orchis cordata, Fritillaria lusitanica, Uropetalum serotinum, Muscari comosum, Equisetum ramosum, Asplenium Adiantum-nigrum.*

Dr. E. F. Kelaart, in 1843–5, enumerated 174 native or naturalized species not previously noted. The list is too long to reproduce. The number does not include any doubtful records or cultivated species.

H. A. Hurst collected in the neighbourhood in 1848. He was careful to label plants not collected on the Rock "near Gibraltar," so I think the following, labelled "Gibraltar," may be relied upon:—

Delphinium Staphisagria!, *Atractylis cancellata*!, and *Chlora perfoliata*!

John Ball collected in the neighbourhood in 1851, and again in 1871. I can only trace the following, probably for the Rock:—

Sisymbrium Irio and *Antirrhinum tortuosum.*

E. Dautez collected from 1872 to 1880, chiefly in the San Roque district, but he has the following records from the Rock. His collections were all determined by M. Debeaux:—

Fumaria agraria, Diplotaxis erucoides, Raphanus Raphanistrum, Lepidium Draba, Senebiera Coronopus, Tuberaria inconspicua, Dianthus Caryophyllus, Saponaria officinalis, Sagina maritima, (*Erodium Salzmanni*), *Melilotus parviflora, Trifolium suffocatum, Astragalus hamosus, Coronilla glauca, Lathyrus Ochrus, Œnothera stricta, Fedia Langei, Conyza ambigua, Gnaphalium luteo-album,* (*Senecio leucanthemifolius*), *Hedypnois tubæformis, Picridium intermedium, Sonchus asper,* (*Andryala laxiflora*), *Cuscuta Epithymum,* (*Lithospermum fruticosum*), *Salvia triloba, Lamium amplexicaule, Stachys lusitanica, Amaranthus deflexus, Rumex crispus, Parietaria mauretanica, Celtis australis, Ophrys Speculum, Allium paniculatum, Setaria verticillata, Cynodon Dactylon, Scleropoa rigida, Lamarckia aurea,* (*Bromus tectorum*), *Hordeum maritimum.*

G. Maw collected *Crocus Salzmanni* on Windmill Hill in 1883.

M. A. de Coincy gathered *Lemna gibba* in or near the Inundation in 1887. He also described in Journ. de Bot. xiii. p. 162 (1899) *Trifolium carteiense* from near San Roque. I have not seen specimens, but it seems to be near *T. lappaceum.*

E. Reverchon collected on the Rock in 1887, but though his new records for Algeciras are considerable, he found nothing new on the Rock.

A few records each have been assigned to the following, with their approximate dates, but the usual doubt exists as to the exact habitats, and I have only admitted them with doubt:—Funk (1848), Laguna (1860), Amo (1860-61), Fritze and Winkler (1873), Bilimek (1877), Hegelmaier (1878), and Perez Lara (1876–80).

The present Flora shows about 101 new records of species, that is, those for which no definite former Rock records exist; but some of them, from their commonness, must have been known to Kelaart and Dautez, and their omission was probably due to an oversight, and about ten were already known on the Neutral Ground. There are in addition about half a dozen naturalized aliens, or casuals, recorded for the first time.

It would occupy too much space to give details of the records of plants found in the neighbourhood of Gibraltar. The botanists who have worked the region are practically the same as those who have explored the Rock, with a few additions.

Very few of the records of Von Martius and Schott have been taken up by later writers on the botany of Spain, while many of those of Salzmann, Broussonet, and later collectors have been adopted. The justification for this is not apparent, unless it be that modern writers have included species from collectors which they have seen. I hesitate on my own responsibility to accept them all, especially as many of them are highly improbable, thus their whole lists are open to suspicion; but I have included the more probable ones in the list of species to be searched for which is given at the end of this preface.

Clusius worked a great deal in Spain, but his localities are not precisely defined, so there are no additional records to those on the Rock. Tournefort also published no list for the surrounding country. Schousboe (1798–9) first found *Linaria Munbyana*, *Salvia bullata*, and *Narcissus viridiflorus*, while Gaudichaud, who gives such an interesting list of Rock plants, did not visit the country round.

Lists of plants collected by the following exist:—

A MS. list of Masson's plants in the National Herbarium names seventeen species for San Roque, of which *Satureia Juliana* is unconfirmed by later authors.

Von Martius's list contains 192 species, at least twenty-five of which are improbable or wanting in confirmation. This large number may be due to incorrect diagnoses, or to the somewhat loose application of the older names, the synonymy of which is often doubtful. Others which are confirmatory of records I had excluded, as well as some of the more likely ones, are taken up in the Appendix to this work.

Schott's list, which he heads "plants collected," contains names of species only known for the Rock, as well as some only known for the neighbourhood, so there is some doubt as to which they should be referred to. It contains 150 species, with about the same number of doubtful records as that of Von Martius, to which the same remarks apply.

Salzmann only names five species, of which only *Ononis hispida*, for which he may have mistaken *O. Cossoniana*, is unrecorded elsewhere.

Willkomm and Boissier published lists of some of the plants they saw in their travels in the works already referred to. These are all taken up in the present Flora.

Kelaart's list in *Flora Calpensis* contains, as already explained, species which occur beyond our limits; those which are unconfirmed for our region are shown in the Appendix to this work.

Dasoi, who collected in 1887, submitted his plants to Gandoger for determination. The result is the inclusion of many improbable names. Moreover, there is no knowledge of the extent of country explored by him, so that his list has no value. It was published in Bull. Soc. Bot. Fr. xxxiv. pp. 223 and 309, and some account of it will be found at the end of Debeaux's Flora.

A much more trustworthy list of Reverchon's finds, mostly about Algeciras in 1887, is published by Rouy in the same volume (p. 434). Fritze, Winkler, Nilsson and Hackel also found many interesting species at about the same time, but I have seen no separate publication of their discoveries.

Dautez, between 1872 and 1880, did an immense amount of good work chiefly in the San Roque district. His plants, many of which have been found by no other botanist, were determined by Debeaux.

Of other collectors not previously named, mention may be made of Gutiérrez, La Gasca, Alioth, de Noe, Kusisnky, and Porta and Rigo, the two last-named finding some half-dozen North African species not hitherto found in Europe.

LITERATURE.

Three works have been devoted to the botany of Gibraltar and its neighbourhood, and one to that of the whole province of Cadiz.

The *Flora Calpensis*, by Dr. E. G. Kelaart, M.D. (1818 ?–1860), of the Army Medical Staff, published in 1846, was for many years the only book on the subject. He enumerates 512 species for the Rock; this number includes about a dozen species mentioned in the notes in parts II. and III., which have been confirmed by other authorities. Several other species so mentioned have not been included. He also enumerates 229 additional species for the neighbourhood, *i.e.* within twenty miles of Gibraltar. His Gibraltar list must, however, be largely discounted by the exclusion of many cultivated species, obvious errors or at least very doubtful records, and naturalized aliens, as well as of plants recorded as species but now reduced to varieties. His nomenclature is sometimes difficult to follow, and there is usually much doubt as to which species were found by him on the North Front, and which on the Neutral Ground, which I have treated as a separate district, and which is really a part of Spain rather than of Gibraltar. Kelaart uses the name Neutral Ground to cover both areas, and though, doubtless, many of the species now found only on the real Neutral Ground were in his day also found on the North Front, there is no certainty; hence some of my exclusions from the restricted Flora of Gibraltar or Rock (District I.) may appear arbitrary. The exclusions from Kelaart's list under these various headings are:—

Cultivated or casual species, and those now reduced to varieties	53
Naturalized aliens	9
Probable errors (some excluded, some only marked with doubt in this Flora) . .	42
Confined to Neutral Ground	12

Leaving 396 species native on the Rock, having the same status as those admitted into the present Flora.

In my citations from Kelaart's book I have made use of the details given in Part II. of the work, which amplify or modify those given in Part III.

After an interval of forty years, Don J. M. Perez Lara began in 1886 the publication of his *Florula Gaditana*—the whole province of Cadiz—in Anales Soc. Hist. Nat. Espan. His work runs interruptedly through vols. xv.—xxvii. (1898), and was completed in 1903 by an appendix published in the Mem. Soc. Esp. Hist. Nat., vol. ii. He does not include many of the previous records, but the later ones of Reverchon, Winkler, Dautez, and other collectors, are all noted. The *Florula* contains useful notes on some of the species, though their utility would have been enhanced had more attention been given to the differentiation of allied species and varieties than to a mere statement of their range of variation, which is confusing rather than elucidatory.

Gibraltar being geographicallly considered as part of Spain, no special effort has been made to segregate its records, consequently several for the neighbouring country have been credited to the Rock itself, and sometimes the reverse mistake has been made. This is doubtless due to the comprehensive use of the name "Gibraltar" by most collectors, and the ambiguity of the name "Neutral Ground," though not actually used by Perez Lara, also has led to confusion.

Perez Lara's work was a great advance on Kelaart's, and surpasses in utility and number of local records that of Debeaux, though the latter was specially devoted to the flora of Gibraltar and its neighbourhood. The total records for the whole province are 1905 species, and after making due allowance for excluded species, doubtful records, naturalized aliens, and those reduced to varieties, there are the following records for our region :—

For the whole region . .	951
For Gibraltar only . .	462

These totals are doubtless larger than they should be, because I have included all species known for our region which Perez Lara specifies as common in the whole province, without giving any detailed stations. Some of these are certainly rare with us, a few are not recorded, and quite a number are not known for the Rock; these last I have, of course, not included in the totals. It is highly probable that no station within our limits was known to Perez Lara for many of the others, but I have been unable to discriminate, so had no alternative but to include all that I knew to exist with us.

A *Synopsis de la Flore de Gibraltar* was published by O. Debeaux in 1888 in Actes Soc. Lin. Bordeaux, vol. xlvii. The author was but slightly acquainted with the region, and appears to have done little or no collecting there himself, relying mainly on notes and specimens submitted to him by Dautez: consequently he gives quite a false impression of the relative frequency of the species, as well as sometimes wrongly assuming a variety only to exist, whereas the type is far the commoner. His prefatory remarks also lose much of their value from the obscurity of his topography; thus, he confuses St. George's Hall, on the northern precipice, with St. George's Tower, near the southern end, better known as O'Hara's Tower but now demolished. I have not, therefore, availed myself of the special localities given in that part of his book. In some cases, also, localities are incorrectly cited, but usually this is due to the comprehensive nature of those on collectors' labels referred to above. There are many omissions of localities recorded by Kelaart for the Rock; though he cites the page in Kelaart's Flora in which the records occur. On the other hand, he credits that author with many localities not mentioned in his work, apparently assuming that Dautez's and Kelaart's stations were identical. Many of my records for District I. have been due to acceptance of Debeaux's citations which further research has proved to be false, necessitating many corrections in my Appendix. Reverchon's finds are often only mentioned in observations interspersed in the text, and it is not clear why these and others are not included in the numbered series. Debeaux enumerates 965 species, and an additional 72 in his observations, making 1037 for the whole region, of which only 367 accepted species are mentioned for the Rock, 29 less than Kelaart enumerates, after making similar deductions for exclusions, &c.

In 1910, Mr. B. H. T. Frere published his *Guide to the Flora of Gibraltar*, which is almost entirely a compilation of previously published records, with the descriptions of all non-British species added. Unfortunately the author had overlooked the publication of Perez Lara's *Florula*, so a large number of available records are omitted, and the few that are added are mostly for species which occur far beyond our limits. The descriptions are not very clearly drawn up, since in attempting to make the work popular the author has made a compromise between technical and popular language, acceptable neither to botanists nor to those with no botanical knowledge. The omission of the descriptions of British species necessitates constant reference to other works which are not always readily obtainable on the spot. There is no attempt to emphasize the differences between allied species, and scarcely any varieties are given. The stations are very vaguely cited, no personal verifications are given, and there are no authorities for the nomenclature. As the work contains very little that is new, and omits *Juncaceæ* and all later orders, I have not attempted to tabulate the species recorded.

The Botanical Districts.

I have divided the region into three main districts:—I. Gibraltar, *i.e.* the Rock and the North Front as far as the British Lines. II. The Neutral Ground, kept as a distinct district for reasons explained below. III. Spain, which I have subdivided into—i. the San Roque subdistrict, from the Mediterranean to the Guadarranque River, as far north as the limits of the region; ii. the Algeciras subdistrict, or all that portion of the region lying south of the Palmones River; and iii. the Palmones subdistrict, between the rivers.

District I., Gibraltar, is of special interest, being wholly British territory. It consists of the Rock proper, with that part of the isthmus joining it to the mainland called the North Front.

The latter is sandy, and is now levelled and turfed for recreation where it is not occupied by buildings; only a small portion near the Devil's Tower and the rifle butts is in anything like its original state. Formerly the North Front was for the most part as wild and rough as the present Neutral Ground, and produced many species now "improved" out of existence, though some doubtless survived until Kelaart's time. These will be dealt with more fully under District II.

The Rock itself is a mass of limestone, sloping towards the west, with the bare rock appearing all over the middle and upper slopes. The backbone of the Rock, which is about two miles long, rises vertically from the North Front to an altitude of 1350 ft. into a sharp ridge from 1000 ft. to 1440 ft. high, extending to O'Hara's Tower, whence it falls steeply to the plateau of Windmill Hill, some 250 ft. above the sea and thence precipitously to Europa Flats at about 100 ft. The shore, except at the North Front and Catalan Bay, and a few points on the western side, is precipitous or artificial, consequently but few maritime plants are found, these being chiefly at Europa Point and Catalan Bay. The slopes are covered with much shrubby vegetation, often difficult to penetrate, and in recent years a considerable number of pine and other trees have been planted on the western slopes. The Alameda Gardens and the slopes towards Rosia were formerly much wilder, and parts of them were cultivated for vines and cereals. In this neighbourhood doubtless several of the species which are now extinct were to be found. On the east side a steep slope of sand gives a foothold for several species which only occur there and on the Neutral Ground, but doubtless formerly also grew on the North Front. Modern improvements and water catchments are rapidly destroying this interesting habitat. *Brassica papillaris* has already disappeared from its only known station.

Gibraltar, which has 587 native species, has a markedly different flora from that of the neighbouring parts of Spain. This is due to its limestone formation, the absence of water or damp places, the rarity of sand dunes, and the almost total absence of agriculture. Thus *Ericaceæ* are totally absent, while many other genera and species, which are quite common in the neighbourhood, are absent, or at least very rare, on the Rock. There are at least 236 such species, without reckoning moisture-loving ones. Another cause, which, however, has tended to a reduction of the number of species rather than to their nature, is to be found in the alteration to the western slopes. Formerly these slopes were open to the browsing of goats, so that the shrubs were rarely allowed to rise to a greater height than three or four feet, allowing plenty of room between them for smaller plants, but now the planting of trees and the erection of an unclimable fence at a low elevation, have kept out the goats, so that the taller growths have been encouraged and crowded out much of the undergrowth. Gaudichaud remarks upon the *total* absence, in 1817, of all trees taller than *Chamærops humilis*, though this must have been an exaggerated statement. Europa Flats and the south and south-east slopes have been less affected by this cause than those to the west and north-west. On the other hand, forty-eight species found on the Rock are absent from the adjacent territory, the following not being recorded from the Cadiz province, some of them (shown in roman type) not being known in Spain at all. No doubtful records or naturalized aliens are included in this and similar lists:—

Clematis cirrhosa v. Dautezi (endemic), *Hesperis laciniata*? *Brassica sabularia* v. papillaris (endemic), Iberis gibraltarica, *Helianthemum origanifolium*, *Dianthus Caryophyllus*, Silene gibraltarica, *Spergularia rupestris*, *Linum maritimum*, *Lavatera arborea*, *Medicago obscura*, *Melilotus infesta*, *Trifolium suffocatum*, *Sedum micranthum*? Saxifraga globulifera v. gibraltarica, Ferula tingitana? *Vaillantia muralis*, *Helichrysum rupestre* v. Boissieri (endemic), *Senecio minutus* v. *gibraltaricus*, *Calendula suffruticosa*, *Barkhausia fœtida*, *Campanula mollis* v. *microphylla*, Antirrhinum tortuosum, *Lafuentea rotundifolia*? *Lavandula dentata*? Thymus diffusus (endemic), Salvia triloba v. calpeana (endemic), Phlomis fruticosa, *Sideritis arborescens*, Achyranthes argentea, *Parietaria lusitanica*, Crocus Salzmanni? *Notochlæna vellea*.

Besides *Ericaceæ* the following are some of the more striking species which are absent from or rare on the Rock, but common in Spain:—*Cistaceæ* (almost all species, though *Helianthemum origanifolium* is found in Gibraltar alone), *Spergula arvensis*, *Erodium primulaceum*, *Ulex* (all species), *Trifolium Cherleri*, *Hedysarum coronarium*, *Œnanthe pimpinelloides*, *Ormenis mixta*, *Carlina racemosa*, *Lavandula Stœchas*, *Romulea ramiflora*.

District II. Neutral Ground.—This is a very small area, about two-thirds of a square mile, lying between the British and Spanish Lines, and reaching from sea to sea. I treat it as a separate district on account of the peculiarity of its situation. It is isolated from the mainland of Spain by the so-called Sand Desert, or extensive sand dunes lying to the north of Linea, and, not being British territory, it cannot be included in District I. From physical considerations, it might have been desirable to have treated the Neutral Ground and North Front together as a separate district, or as part of District III., but it seems best to make the British Lines the limit of Gibraltar. The chief difficulty that arises is from the doubt whether many of the old records refer to the North Front or the Neutral Ground; but this is of less importance in view of the fact already pointed out, that formerly there was no North Front, so that the flora of the Neutral Ground must have reached the foot of the Rock. Its surface, though approximately level, is sufficiently undulating to allow pools of water to stand throughout the rainy season, thus providing suitable soil for quite a number of marsh-loving species to grow, chiefly on the west side, which is for the most part grassy. Towards the east the soil becomes more and more sandy, till on the shore only a few species are found, such as *Matthiola tricuspidata*, *Silene nicæensis*, *Ononis variegata*, *Medicago marina*, *Eryngium maritimum*, *Diotis maritima*, *Pancratium maritimum*, and a few grasses.

The flora on the west and part of the east side is rich and varied, a number of species being found which, though fairly frequent in Spain, do not grow in the Sand Desert, and in some cases are rare south of San Roque. Besides several short visits I devoted two days to making as complete a list as possible of all the species seen. The number, including old records, amounts to 231, including five naturalized aliens, but without reckoning doubtful species or records, and there is no doubt that this can be increased. For example, several which occur *either* on the North Front *or* the Neutral Ground have been reckoned in neither. Twelve species and varieties are confined in our region to this district, *viz.* Reseda propinqua, *Erodium laciniatum* v. *involucratum*, *Ononis Tournefortii*, *O. variegata* v. *erioclada*, *Medicago littoralis* v. *inermis*, *Anthyllis Vulneraria* (type), *Centaurea sonchifolia*, *Veronica anagalloides*, *Euphorbia terracina* v. *latifolia* and v. *retusa*, *Juncus pygmæus*, *Paspalum Digitaria*, but of these all but the *Medicago* and the two last are in need of modern confirmation. No fewer than sixty-five species and several varieties do not occur in District I., though many occur in Spain. The commoner species are:—*Ranunculus trilobus*, *R. muricatus*, *Diplotaxis siifolia*, *Ononis variegata* (var. *erioclada* is endemic), *Medicago littoralis*, *Trifolium resupinatum*, *Lotus arenarius*, *Paronychia argentea*, *Hippomarathrum pterochlænum*, *Bellis annua*, *Perideræa fuscata*, *Xanthium macrocarpum*, *Echium plantagineum*, *Linaria pedunculata*, *Plantago Coronopus*, *Alisma ranunculoides*, *Romulea ramiflora*, *Pancratium maritimum*, *Juncus acutus*, *Polypogon monspeliensis*, *Vulpia Alopecurus*.

District III. Subdistrict i. SAN ROQUE.—This subdistrict, which has an area of about thirty-one square miles, is of a varied nature. The whole southern end, for a distance of a mile or more, with a narrow belt along the coast, is of deep sand. This is succeeded by the Carteian Hills, of a hard stony gravel, with pockets of clay in many places, and with an undulating surface. Towards the east the Queen of Spain's Chair (Sierra Carbonera), of sandstone, rises to a height of 978 ft. The north-western end merges into the Cork Woods, which are for the most part sandy, with several marshes about the watercourses, some of which are perennial. The north-eastern portion, from the edge of the Cork Woods, is of an ericetal type running into the rugged Alcadeza Crags and Sierra Lorca, which produce some interesting and rare species. Around San Roque the country was, not many years ago, in a more or less virgin state, but is now mostly cultivated, which has changed the nature of its flora, and has perhaps extinguished a few species, but some of the more interesting ones remain. The Guadarranque River is tidal and muddy for a short distance from its mouth, otherwise there are no saline marshes.

Though this subdistrict has perhaps been more searched than any part except the Algeciras Mountains, there is still much to be done, the north-eastern slopes of the Chair, and especially the

Cork Wood and Alcadeza Crags being parts where new records can readily be made. It contains about 1020 native species, of which over 140 do not occur for certain elsewhere in our region. The list is too long to detail, but the following, in addition to several varieties, do not occur elsewhere in the province, those in roman type not being recorded from Spain, while those marked ? may occur elsewhere in our region:—Ranunculus tripartitus, *R. sceleratus*, Anemone coronaria v. micrantha (endemic), *Nasturtium hispanicum*, *Brassica fruticulosa* ? *Helianthemum glaucum*, *Dianthus lusitanicus*, *Silene mellifera*, *S. italica*, *S. commutata*, Linum decumbens, *Hypericum crispum*, Genista Winkleri (endemic), *G. Hænseleri*, *Ononis breviflora*, *O. Natrix*, *Hippocrepis unisiliquosa*, *Vicia cassubica*, *V. tenuifolia*, *Spiræa flabellata*, *Sedum amplexicaule*, *Valerianella carinata*, *Cephalaria syriaca*, *Eupatorium cannabinum*, Prolongoa pectinata (confined to Cadiz province), *Filago apiculata* ? *Carlina lanata*, *Carduus nigrescens* ? *Centaurea alba*, C. uliginosa, *C. Seridis* ? Jasione rosularis (endemic), *Campanula dichotoma*, *Erythræa Barrelieri*, *Convolvulus undulatus*, Orobanche mauretanica ? *O. variegata*, *O. Hederæ*, Anagallis platyphylla, Euphorbia gibraltarica (endemic), *Pinus halepensis*, *Zannichellia macrostemon*, *Potamogeton americanus*, *P. pusillus*, Asphodelus serotinus (endemic), *Carex paniculata*, C. punctata, *Tragus racemosus*, *Aira multiculmis*, *Glyceria loliacea*, *Lepturus incurvatus*, *Isœtes bœtica* (endemic), *Polystichum Thelypteris*.

District III. Subdistrict ii. ALGECIRAS.—This subdistrict, of twelve and a half square miles, is the only one, except that of Gibraltar, which contains mountains of over 1000 ft. high. The range behind Algeciras is usually called the Sierra de Palma or the S. de Luna, but I have been unable to verify that these names are used locally, nor to which portions of the range they apply. Debeaux usually, though not invariably, writes of the S. de Luna as in the Los Barrios district, but they certainly lie south of the Palmones River, and are perhaps the northern end of the range. I have called the whole range, of which I have personally only worked the portion nearest to Algeciras, the "Mountains behind Algeciras," or simply "Mountains." They are mostly covered with cork and oak trees, with shrubs of the *Cistaceæ*, *Leguminiferæ*, and *Ericaceæ*, the undergrowth being ericetal. The valleys are well-watered, and produce many moisture-loving plants, but as the elevation increases the vegetation becomes more xerophilous, and nothing of an alpine or subalpine nature is found, unless *Corbularia Bulbocodium* be so classified. The lower hills about Algeciras and the higher ones towards Carnero Point have a somewhat similar flora to that of hills of the same nature about San Roque, but at Carnero Point species found elsewhere only on the Rock reappear, e. g. *Silene obtusifolia* and *Asteriscus maritimus*. There are sandhills at Sandy Bay, south of Algeciras, and from about a mile north of the town up to the Palmones River there are extensive sands, much of which is cultivated for vegetables. The river is tidal and its muddy shores support a few halophilous plants.

The subdistrict contains 950 species, about 120 of which do not occur elsewhere in our region. The following are not recorded from elsewhere in the province, those in roman type being unknown in Spain:—*Ranunculus flabellatus* v. acinacilobus? gregarius? and confertus (all endemic), *Fumaria arundana*, *Brassica lævigata*, Halimium formosum, Silene mogadorensis, *Silene nutans*, *Mœhringia pentandra*, Arenaria algarbiensis, Ulex luridus, *U. brachyacanthus*, *Ononis crotalarioides* (v. rubricaulis is endemic), *Melilotus alba*, *Trifolium filiforme*, T. Jaminianum, T. Juliani, *Tetragonolobus conjugatus*, *Lotus uliginosus*, *Vicia onobrychoides*, *V. bætica*, *V. disperma*, *Potentilla Tormentilla*, *Peplis Portula*, *Myriophyllum alterniflorum*, *Isnardia palustris*, *Sanicula europæa*, Bupleurum foliosum, *Opononax Chironium*, *Coleostephus Myconis*, Evax Cavanillesii, *Carduus nutans*, *Centaurea sempervirens*, *Leontodon hispanicus* var. psilocalyx (endemic), *Crepis corymbosa*, *Myosotis lingulata*, M. maritima? *Veronica persica*, Bartsia aspera, *Orobanche loricata*, *O. Rapum-Genistæ*, *O. Hænseleri*, Mentha Bauhini, *Salvia Sclarea*, Teucrium campanulatum? T. bracteatum (only near Tarifa), *Plantago amplexicaulis*? *Rumex Friesii*, Mercurialis Reverchoni (endemic), Orchis palustris, *Iris juncea*, Allium rubrovittatum, *A. Moly*, *Juncus foliosus*, *J. sylvaticus*, *J. supinus*, *Cyperus esculentus*, Rynchospora glauca, *Carex acuta*, *Arrhenatherum pallens*, Kœleria Salzmanni v. valdepilosa (endemic), *Holcus grandiflorus*, *Festuca montana*, *Notochlæna Marantæ*.

District III. Subdistrict iii. PALMONES.—This is a small subdistrict, and I have only worked a small portion of it, namely about three square miles. On the coast is a broad stretch of sand dunes, with some damp hollows, the ground becoming muddy and saline towards its western end, which I have called the Palmones or Guadarranque Marshes. This is succeeded by a line of salt pans, separated from the sand dunes by a cultivated strip. North of this, again, there is an extensive freshwater marsh, which I have designated the Guadacorte Marshes. On the east the Palmones River, with its tributary the Aguacorte, has muddy banks which produce a few local species. Inland from the Guadacorte Marshes the country rises in undulating hills of a similar nature to those about San Roque, till the higher ground of the S. de Rompecoche or S. de Alcala is reached, but I have not explored this part, nor have I any records from it.

The subdistrict being a small one, containing 520 species; only sixteen, of which six are grasses, are known in it which are unrecorded from other parts of the region, but several others are very local elsewhere. The following are not recorded elsewhere in the province:—*Trifolium cernuum*, Astragalus algarbiensis, *Peplis erecta*, *Umbilicus pendulinus* v. truncatus (endemic?), *Erythræa spicata* v. glauca (endemic?), *Myosotis sicula*.

GEOGRAPHICAL DISTRIBUTION OF SPECIES.

It is hoped that the following arrangement will bring out the distribution of the species in a clearer manner than that adopted by Debeaux, though no selection of zones can be made which will include all the species without allowing some elasticity. The majority of our species, as will be seen, reappear in North Africa, that is, either in Morocco or Algeria, although, in so far as Europe is concerned, many may be restricted to the Cadiz province, to our own region, or even to the Rock. Many others, although included in a defined zone, may also occur in some more or less isolated and often distant country, such as Egypt, Asia Minor, or even Siberia, so that they cannot strictly be regarded as peculiar to that zone, though they seem better placed to it than to any other. It would occupy too much space to detail all these outliers of the larger zones, so I have only detailed those of the smaller ones.

In general, I have only considered the distribution in Europe and North Africa, so that many of the species in zones 8, 10, and 11, may occur in Asia or even America, while many of those in zones 7 to 11 range as far as the Canaries. It will be seen that about 85 per cent. of our species reappear in North Africa, *i.e.* either in Morocco or Algeria.

Varieties of which the types do not occur within our limits are reckoned as species, otherwise they are not included except in the first four zones, nor are naturalized species nor doubtful records included. The percentages are calculated upon the number included in this enumeration, which slightly differs from the total known for the region, a few being omitted as fitting no particular zone, while several varieties are included.

ZONE 1. ROCK AND NORTH FRONT.—The species and varieties peculiar to the Rock are eight, or 0·6 per cent. of the total, viz. *Clematis cirrhosa* v. *Dautezi*, *Iberis gibraltarica* (also N. Africa), *Brassica sabularia* v. *papillaris*, *Saxifraga globulifera* v. *gibraltarica* (also N. Africa), *Helichrysum rupestre* v. *Boissieri*, *Senecio minutus* v. *gibraltaricus*, *Thymus diffusus*, *Salvia triloba* v. *calpeana*.

Cerastium Boissieri v. *gibraltaricum* is excluded, being found also in the Granada province.

ZONE 2. THE LIMITS OF THIS FLORA.—The following forty-two, or 3·0 per cent. of the total, are confined in Europe to our limits, viz. *Ranunculus flabellatus* v. *acinacilobus*, v. *gregarius*, and v. *confertus*, *Anemone coronaria* v. *micrantha*, *Fumaria sepium*, *Tuberaria variabilis* v. *brevipes*, *Reseda propinqua* (also N. Africa), *Silene mogadorensis* (N. Africa), *Genista Winkleri*, *Ononis Cossoniana* v. *rotundifolia*, *O. crotalariodes* v. *rubricaulis*, *Trifolium Juliani* (N. Africa), *Tetragonolobus pseudopurpureus*, *Vicia vestita* v. *tuberculata*, *Umbilicus pendulinus* v. *truncatus*, *Bupleurum foliosum* (N. Africa), *Œnanthe globulosa* v. *Kunzei*, *Lonicera implexa* v. *puberula*, *Pycnocomon rutæfolium* v. *bæticum*, *Bellis rotundifolia* v. *hispanica*, *Senecio Lopezii* v. *minor*, *Carduus myriacanthus* (N. Africa), *Leontodon hispanicus* v. *psilocalyx*, *Jasione rosularis*, *Erythræa acutiflora*, *Scrophularia laxiflora*, *Betonica algeriensis* (N. Africa), *Anagallis platyphylla* (N. Africa), *Rumex bucephalophorus* v. *perennans*, *Mercurialis Reverchoni*, *Euphorbia gibral-*

tarica, *Narcissus viridiflorus* (N. Africa), *Asphodelus serotinus*, *Rynchospora glauca* v. *pauciseta*, *Leersia hexandra* (N. Africa), *Paspalum Digitaria*, *Cymbopogon hirtus* v. *podotrichus*, *Agrostis alba* v. *fuscescens*, and v. *myriostachys*, *Koeleria Salzmanni* v. *valdepilosa*, *Melica minuta* v. *arrecta*, *Isœtes bœtica*.

A few are only found also elsewhere as stated:—*Ranunculus Winkleri* (S. de Mijas), *Ulex brachyacanthus* (S. de Mijas), *Trifolium Jaminianum* (S. Italy and Algeria), *Ferula tingitana* (Morocco and Orient), *Myosotis maritima* (Azores), *Teucrium bracteatum* (Tarifa and Morocco), *Statice spathulata* (Tarifa and N. Africa), *Allium rubrovittatum* (Crete), *Holcus grandiflorus* (Granada), *Festuca montana* (N. Africa, Estepona).

ZONE 3. THE CADIZ PROVINCE contains the following twenty-four of our species, or 1·8 per cent. of the total, only found therein, in addition to those in the above two zones:—

Ranunculus flabellatus, *Fumaria sepium* v. *gaditana* (N. Africa), *Biscutella scutulata*, *Halimium eriocephalum* v. *asperrimum*, *Tuberaria echioides* (N. Africa), *Rhamnus Frangula* v. *longifolia*, *Cytisus candicans* v. *Kunzeanus*, *C. tribracteolatus*, *Ulex Boivini* v. *megalorites* (N. Africa), *U. scaber* (N. Africa), *Ononis Tournefortii* (N. Africa), *Umbilicus citrinus*, *Prolongoa Pseudanthemis*, *Crepis tingitana* (N. Africa), *Tolpis barbata* v. *grandiflora* (N. Africa), *Linaria Munbyana* (N. Africa), *Satureia inodora* (N. Africa), *Salvia tingitana* (N. Africa), *Teucrium Scorodonia* v. *bœticum* (N. Africa), *Crocus Salzmanni* (N. Africa), *Molineria minuta* v. *bœtica*, *Corynephorus macrantherus*, *Trisetum Dufourei* v. *lasianthum*, *Vulpia Alopecurus* v. *sylvatica*.

The following almost fall into this zone, but occur outside the province in the additional countries mentioned, viz. *Diplotaxis siifolia* (Seville and N. Africa), *Erodium laciniatum* v. *involucratum* (Algeria and Sicily), *Spergularia fimbriata* (N. Africa and Canaries), *Linum decumbens* (S. Italy, Sicily, and Tunis), *Ononis filicaulis* (N. Africa and Estepona), *Vicia bœtica* (Malaga), *Pistorinia Salzmanni* (Jaen and N. Africa), *Pinardia anisocephala* (Palestine and N. Africa), *Hedypnois arenaria* (Huelva and N. Africa), *Salvia bicolor* (Estepona and N. Africa), *Armeria bœtica* (Estepona and N. Africa).

ZONE 4. THE CADIZ PROVINCE AND PORTUGAL, but not elsewhere in Spain, contains, in addition to those in zone 3, twenty-four species, or 1·8 per cent. of the total, *viz.*:—

Halimium formosum, *Silene longicaulis*, *S. gibraltarica* (N. Africa), *Arenaria algarbiensis*, *A. emarginata* (N. Africa), *Hypericum tomentosum* v. *lusitanicum*, *Ulex luridus*, *U. scaber* v. *glabrescens*, *Ononis pinnata*, *O. Cossoniana*, *Astragalus algarbiensis*, *Lœfflingia micrantha*, *Centaurea uliginosa*, *Rhododendron bœticum*, *Bartsia aspera* (N. Africa), *Pedicularis lusitanica*, *Salvia bullata*, *Statice diffusa*, *Romulea gaditana*, *Fritillaria lusitanica* v. *stenophylla*, *Agrostis Juressi*, *Trisetum Dufourei* (type), *Atropis iberica*, *Vulpia Alopecurus* v. *lanata*.

Outliers, elsewhere as well as Cadiz and Portugal, are:—*Silene obtusifolia* (Algeria and Canaries), *Ulex aphyllus* and

U. spartioides (Galicia), *Centaurea polyacantha* (Morocco and Valencia), *Erythræa grandiflora* (Sicily and Tunis), *Romulea Clusiana* (Algeria and Estepona), *Carex ambigua* (N. Africa and Balearic Islands), *Davallia canariensis* (Canaries).

Zone 5. South Spain, *i.e.* the whole of Andalucia, with the Province of Murcia and South Portugal, contains ninety-two species additional to the above, or 6·9 per cent. of the total, of which sixty-six are N. African.

Zone 6. Spain, with Portugal, the extreme south of France, and the Balearic Islands, contains one hundred species, or 7·4 per cent. of the total, of which seventy-two are N. African.

Zone 7. West Mediterranean, as far as Italy, with some outliers in Greece, contains 166 species, or 12·3 per cent. of the total, of which 144 are N. African.

Zone 8. Mediterranean, with Southern Europe, contains 372 species, or 27·5 per cent. of the total, of which 356 are N. African.

Zone 9. Western Europe, *i. e.* Britain, France, Spain, and Portugal, contains forty-three species, or 3·2 per cent. of the total, of which twenty-three are N. African.

Zone 10. Central, West, and South Europe, including species common to 8 and 9, but not enumerated therein, contains 234 species, or 17·3 per cent. of the total, of which 215 are N. African.

Zone 11. Europe contains 247 species, or 18·3 per cent. of the total, of which 238 are N. African.

Summary.

The number of species and varieties recorded in this Flora is as follows:—

	Dist. I.	Dist. II.	District III.				Whole Region
			Sub-dist. i.	Sub-dist. ii.	Sub-dist. iii.	Total	
Species enumerated ..	766	263	1095	1003	555	1349	1462
Deduct cultivated species, errors, doubtful records, and naturalized aliens ..	179	32	76	54	35	86	155
Total native species ..	587	231	1019	949	520	1263	1307

There are also about 260 varieties, exclusive of those reckoned as species. Where the type of a species is not found, its principal variety is reckoned as a species, not as a variety.

Of the total of 1307 species, 234 are not recorded elsewhere in the province, and sixty-six are not known elsewhere in Spain.

The species of these two categories, which are special to one district or subdistrict, have already been enumerated; those occurring in more than one are as follows. As in similar lists, those not recorded for Spain are shown in roman type, and a "?" indicates doubt as to the correctness of the inclusion of the species in the list, not doubt as to its occurrence. All doubtful records, and as a rule varieties, are omitted:—*Ranunculus Drouetii, R. blepharicarpus, R. Winkleri, R. ophioglossifolius, Matthiola sinuata, M. tricuspidata, Succowia balearica, Brassica Tournefortii, Reseda alba, Silene obtusifolia, S. vespertina, Sagina maritima, Alsine tenuifolia* (v. *hybrida*), *Cerastium brachypetalum, Spergularia purpurea*, S. atheniensis, *Geranium columbinum, Genista Hænseleri, Ononis repens, Melilotus elegans, M. messanensis, Trifolium subterraneum*, Tetragonolobus pseudopurpureus, *T. siliquosus, Lotus edulis, Rosa micrantha, Alchemilla arvensis, Epilobium Tournefortii, Herniaria incana, Illecebrum verticillatum, Sedum micranthum, S. Winkleri, Petroselinum peregrinum*, Bellis rotundifolia, (*Pulicaria dyssenterica*) v. *hispanica*, Pinardia anisocephala, (*Senecio Lopezii*) v. minor (endemic), *Kentrophyllum arborescens*, Carduus myriacanthus, *Hyoseris scabra, Hypochæris glabra*, Erythræa acutifolia (endemic), *Convolvulus siculus, Echium maritimum*, Scrophularia laxiflora (endemic), *Orobanche Caryophyllacea, O. sanguinea, O. Picridis, Thymus vulgaris, Prasium majus, Centunculus minimus*, Statice emarginata (elsewhere only at Tarifa), Rumex thyrsoideus, *R. scutatus, Polygonum serrulatum, Euphorbia rupicola*, E. pterococca, *Callitriche hamulata, Salix cinerea, Alisma ranunculoides, Orchis cordata, Neotinea intacta, Spiranthes æstivalis, Epipactis atrorubens*, Limodorum abortivum, *Iris filifolia*, Narcissus viridiflorus, Ruscus Hypophyllum, *R. Hypoglossum, Ornithogalum pyrenaicum, Allium sphærocephalum, A. nigrum, Juncus capitatus, Luzula Forsteri*, Pycreus Mundtii? *Eleocharis multicaulis*, Fuirena pubescens, *Carex depressa, C. extensa, C. lævigata*, Leersia hexandra, *Phleum pratense, Chrysopogon Gryllus, Antinoria agrostidea, Corynephorus fasciculatus, Kœleria pumila*, Atropis iberica, *Schismus marginatus, Serrafalcus commutatus, Agropyron campestre*.

In addition to the species excluded, or marked with a sign of doubt in the Flora, the Appendix, or in this preface, the following should be looked for, as well as types of species of which only varieties are recorded, and varieties of many of the species. The names in brackets are those of the collectors who have recorded them from the neighbourhood, but with the exception of Kelaart's records I have only given those which seem likely to occur from the lists of others. Several names in Kelaart's list which do not appear here are synonymous with species already included elsewhere. His *Fumaria hygrometrica* is doubtless a misprint for *Funaria*, and *Carex marina* is *C. maxima*. The species followed by *P. L.* are those said by Perez Lara to be common in the whole province. I have not included the supposed finds of Dasoi, nor the North African species mentioned in Willkomm and Lange's *Prodromus* as likely to occur:—

Helianthemum villosum Thib. (*Schott*).
Cytisus albus Link. (*Schott*, as *Spartium multiflorum*).
C. patens L. (*Schott*).
Calycotome spinosa Link. (*K.*?).
Genista horrida DC. (*K.*).
G. hirsuta Vahl. (*K.*).
Adenocarpus intermedius DC. (*Schott*, as *Cyt. divaricatus*).
Ulex europæus L. (*Von Martius, Schott*).
Ononis monophylla Desf. (*K.*).
O. hispida Desf. (*Von Martius, Salzm.*).
Trifolium hirtum All. (*K.*).
Anthyllis onobrychioides Cav. (*Schott*).
Glycyrrhiza glabra L. (*K.*).
Hippocrepis ciliata Willd. (*K.*).
Onobrychis horrida Desv. (*K.*).
Poterium agrimonioides L. (*K.*).
Cratægus oxyacantha L. (*K.*).
Herniaria cinerea DC. (*K., P. L.*).
Cucumis Colocynthis L. (*K.*).
Pistorinia hispanica DC. (*Schott*).
Paronychia nivea Boiss. (*K.*).
Eryngium tenue Lamk. (*Schott*).
E. campestre L. (*P. L.*).
Pimpinella Anisum L. (*Von Martius*).
Viscum cruciatum Sieb. (*K., Frere*).
Rubia tinctorum L. (*Von Martius, &c.*).
Tanacetum annuum L. (*P. L.*).
Phagnalon rupestre DC. (*P. L.*).
Onopordon nervosum Boiss. (*P. L.*).
Picnomon Acarna Cass. (*P. L.*).
Carduus Reuterianus Boiss. (*P. L*).
Scolymus grandiflorus Desf. (*Schott*).
Lactuca Scariola L. (*P. L.*).
Erythræa chloodes Gren. & Godr. (*Von Martius, Schott*, as *E. conferta*).
Cressa cretica L. (*K.*).
Nonnea nigricans DC. (*K.*).
Echium gaditanum Boiss. (*K.*).
Withania frutescens Pauq. (*K.*)
Mandragora officinalis L. (*K.*).
Scrophularia Scorodonia L. (*K.*).
Veronica saxatilis Jacq. (*K.*).
Euphrasia minima Schleich. (*K.*).
Lavandula latifolia Vill. (*K.*, as *L. Spica* DC.).
Thymus mastichinus L. (*P. L.*).
T. Zygis L. (*P. L.*).
Teucrium spinosum L. (*K.*).
Globularia Alypum L. (*P. L.*).
Anagallis collina Schousb. (*Von Martius, Schott*).
A. tenella L. (*K.*).
Limoniastrum monopetalum Boiss. (*P. L.*).
Plumbago europæa L. (*K.*).
Amaranthus viridis L. (*P. L.*).
Plantago albicans L. (*P. L.*).
Rumex Acetosella L. (*K.*).
Quercus Ballota Desf. (*P. L.*).
Salix purpurea L. (*P. L.*).
Juniperus phœnicea L. (*P. L.*).
Zannichellia palustris L. (*P. L.*).
Potamogeton natans L. (*K.*).
Phucagrostis major Cav. (*K.*).
Orchis saccata Ten. (*K.*).
Scilla verna Huds. (*K.*).
Muscari racemosum DC. (*K., P. L.*).
Merendera montana Lge. (*K.*).
Aphyllanthes monspeliensis L. (*P. L.*).
Cyperus hirsutus Salzm. (*K.*). Unknown ?
Eleocharis acicularis R. Br. (*Von Martius*).
Phalaris nodosa L. (*P. L.*).
Anthoxanthum odoratum L. (*K.*).
Alopecurus pratensis L. (*Von Martius*).
Echinaria capitata Desf. (*K.*).
Phragmites gigantea Gay (*P. L.*).
Aristida cærulescens Desf. (*K.*).
Eragrostis megastachya Link. (*P. L.*).

PLAN OF THE FLORA.

As space has been an object, I have been obliged to make my remarks in the body of this work as brief as possible, having principally confined them to short notes which may be found helpful in distinguishing allied species. As already explained, I had not hoped for time to carry out much of the research work dealt with in this preface; consequently the resulting corrections have to be embodied in an Appendix instead of in the main body of the work.

The few synonyms cited are those names, or most of them, which have been used for the species in Debeaux's and Kelaart's Floras.

The months of flowering have presented some difficulty. They are mostly taken from my own observations, which I find to agree much more closely with those given by Perez Lara than with Willkomm and Lange's, which latter, of course, deal with the whole of Spain. Our own region, having so much milder a winter, naturally has a much earlier flowering season. Even on the Rock plants often flower from three to five weeks earlier than in the surrounding country. Some also flower almost the whole year round, or at irregular periods depending on the season, so an accurate flowering time is not easy to define. For those species which I have not myself seen in flower, I have quoted the months given by Perez Lara.

In giving the relative frequency of the species, I may have been in error in supposing that those which I have not myself found are rare; they are at least not likely to be common. The impression given by Debeaux is in some cases quite misleading.

The citation of other collectors is only given in the case of stations in which I have not myself seen the species, and is not always the oldest record, but a selection of what appears to be the most reliable from those given by Perez Lara or Debeaux.

The collection which I made is deposited in the Gibraltar Garrison Library, duplicates of nearly all the specimens of my first year's gatherings (to no. 1502) being in the Department of Botany of the Natural History Museum at South Kensington, and of the second year (no. 1503 to end) at Kew.

The collection having been made principally for local use, the localities given on my labels may, I fear, be not very clear to those unacquainted with the neighbourhood. The names for places in Spain can nearly all be found on the Hunting Map of Gibraltar, but have been used in a somewhat comprehensive sense. Thus, for want of any better name, I have called the whole of the area between the east foot of the Queen of Spain's Chair and the sea, "Bonel's Farm," while the west slopes more or less opposite San Roque I designate "Pindalista." Local names for precise localities are most difficult to obtain, and would probably be unintelligible to any one but members of the Calpe Hunt.

In conclusion, I must offer my best thanks to the several friends who have most kindly assisted me with the determination of the more difficult species. Dr. O. Stapf has named all my grasses, Mr. Turrill the sedges, Mr. H. W. Pugsley the fumitories, and Prof. Beck the Orobanches. Valuable help in various genera and species has also been given by the Rev. E. S. Marshall, Mr. Arthur Bennett, Mr. G. C. Druce, Mr. J. Groves, and members of the staff at Kew and South Kensington.

I must also thank the Editor of this Journal for kindly granting me space to publish this Flora, failing which it would have been difficult, if not impossible, to bring it out in its present form at all, and for many suggestions.

I recapitulate for convenience of reference the numbers of the districts into which I have divided the region, and give a list of the conventional signs used, and the collectors' abbreviated names.

District I. The Rock itself, and the North Front, *i.e.* the whole British territory.
,, II. The Neutral Ground.
,, III. Spain, subdivided into—
Subdistrict i. San Roque, as far as the Guadarranque River.
,, ,, ii. Algeciras, from the Palmones River to the Straits.
,, ,, iii. Palmones, between the rivers.

* Denotes naturalized aliens.

† Denotes species or varieties not recorded elsewhere in the Province of Cadiz.

[ ] Denotes species which are excluded either as cultivated, casual, imperfectly naturalized, or incorrectly diagnosed.

? After a species or variety denotes doubt as to the correctness of the name, or after a station the occurrence of the species indicated in the station named.

! After a locality or a collector's name indicates that I have seen a specimen in that locality, or by that collector.

Collectors' abbreviated names are as follows:—

B. & R. = Boissier & Reuter.
Clem. = Clemente.
Clus. = Clusius.
Colm. = Colmeiro.
D. = Dautez.
Deb. = Debeaux.
Dur. = Durand.
K. = Kelaart.
Lem. = Lemann.

Lge. = Lange.
Nilss. = Nilsson.
P. L. = Perez Lara.
Pourr. = Pourret.
Rev. = Reverchon.
Salzm. = Salzmann.
Schousb. = Schousboë.
Wk. = Willkomm.
Winkl. = Winkler.

A. H. W.-D.

September, 1914.

A

FLORA OF GIBRALTAR
AND THE NEIGHBOURHOOD

BY

MAJOR A. H. WOLLEY-DOD

Issued as a Supplement to 'Journal of Botany,' 1914

LONDON
WEST, NEWMAN & CO., 54, HATTON GARDEN, E.C.
—
1914

A FLORA OF GIBRALTAR

AND THE NEIGHBOURHOOD.

By Major A. H. WOLLEY-DOD.

Introductory Note.

In the following list of plants recorded from Gibraltar and its neighbourhood I have divided the region into three districts, as follows:—

I. The British territory, *i.e.* the Rock itself and the North Front.
II. The Neutral Ground.
III. Spain, subdivided into three sub-districts—
    i. San Roque, as far as the Guadarranque River.
    ii. Algeciras, from the Palmones River to the sea.
    iii. Palmones, between the rivers.

The books consulted have been the following:—

Boissier, *Voyage Botanique dans le Midi de l'Espagne*, cited as *Voy. Bot.*; Kelaart, *Flora Calpensis*, cited as *K. Fl.*; Debeaux, *Flore de Gibraltar*, cited as *Deb. Fl.*; Perez Lara, *Florula Gaditana*, cited as *P. L. Fl.*; Frere, *Synopsis of the Flora of Gibraltar*, cited as *Frere.*

The following signs and abbreviations are used:—

* Denotes naturalized aliens. † Denotes species or varieties not recorded elsewhere in the Province of Cadiz. [ ] Denotes species which are excluded either as cultivated, casual, imperfectly naturalized, or incorrectly diagnosed. ? Denotes doubt as to the correctness of the name or of the occurrence of the species indicated in the station named. ! After a locality or a collector's name indicates that I have seen a specimen in that locality, or by that collector.

The following abbreviations have been adopted for names of collectors:—

Clem. = Clemente.
Clus. = Clusius.
Colm. = Colmeiro.
D. = Dautez.
Deb. = Debeaux.
Dur. = Durieu.
K. = Kelaart.
Lem. = Lemann.
Lge. = Lange.
Nilss. = Nilsson.
P. L. = Perez Lara.
Pourr. = Pourret.
Rev. = Reverchon.
Salzm. = Salzmann.
Wk. = Willkomm.
Winkl. = Winkler.

A fuller introduction will be issued on the completion of the Flora, when this Introductory Note may be cancelled.

RANUNCULACEÆ.

Clematis Flammula L. Bushy places and watercourses; rather frequent; 6–7. I. Engineer Road! III. i. Cork Woods! Arroyo Viejo! ii. Palmones Pinar! Carnero Hills! Mountains behind Algeciras! iii. Salt Pans! Near Los Barrios Station!

Var. *maritima* DC. has linear lanceolate leaflets. II. *D.*, not there now. III. i. Punta Mala, *D.* ii. Carnero Hills, probably this!

C. cirrhosa L. Bushy and rocky ground; very common on Rock; rather frequent in Spain; 11–1. I.! III. i. Cork Woods! Alcadeza Plains! Almendral, *K.* ii. Carnero Hills! Waterfall Valley!

†Var. *Dautezi* Deb. Flowers large, deep purple, marked inside with numerous black spots. I. Europa Point, Alameda, and other southern parts of the Rock, *K.*, *D.* I have never met anyone who has seen this. The petals in the type are sometimes reddish on the back.

Nigella hispanica L. Cultivated ground; rather frequent; 5–6. III. i. Campamento! Carteian Hills! Beyond San Roque! ii. Waterfall Valley!

N. damascena L. Similar places and bushy hills; much less frequent. I.? *K.* II. *K.*; probably same station. III. i. Cork Woods! Near first Pine Wood! Almendral! Pindalista! ii. Carnero Hills! Near Algeciras!

Delphinium peregrinum L. Sandy places; very common; 6–9. I use this name to cover species with the lateral petals either elliptical and narrowed into the claw, or suborbicular and truncate or subcordate below. For note on the species see Journ. Bot. 1914, p. 10.

Var. *confertum* Boiss. (*D. cardiopetalum* DC.) has a dense raceme, and appears rare. III. ii. Algeciras, *Schott.*

Var. *longipes* Boiss. (*D. junceum* DC., *D. gracile* DC.) has elongate lax racemes. I have seen it only with truncate or subcordate lateral petals. I.! II.! III.!

D. pentagynum Desf. Bushy and rocky places; rather frequent; 5-6. I. Upper Rock! III. i. San Roque! ii.! Reaches the Mountains.

D. Staphisagria DC. Similar places; rare; 5-6. I. *Dur.* III. i. Near Almoraima Station! iii. Near railway bridge over Guadarranque!

†*Ranunculus tripartitus* DC. Pools and streams; rare; 3–4. III. i. Running water on south slopes of Almoraima, *Wk.*! Willkomm's specimen at Kew has not the characteristic capillary submerged leaves; the floating leaves are deeply tripartite with bilobed segments. Wet places between San Roque and Linea, *Frere.*

R. dubius Freyn. Similar places; rare; 3–4. III. ii. or iii. Palmones River, *Rev.*

R. Drouetii Godr. Similar places; occasional; 2–5. Flowers small. III. i. Puente Mayorga! Mill Soto! ii. By Palmones new road bridge! iii. Salt Pans!

R. peltatus Schrk. Similar places; rather frequent; 2–5. Flowers the largest of our species. III. i. Mill Soto, abundantly! ii. Roadside near Algeciras! Palmones Playazo! M. de la Torre! iii. Salt Pans! Railside near Los Barrios!

Var. *radiatus* Freyn has floating leaves with radiating segments. III. ii. Algeciras marshes, *Winkl.*

Var. *pseudofluitans* Freyn, lower leaves with long flaccid segments, usually none floating. III. ii. Algeciras marshes, *Winkl.*

Var. *truncatus* Hiern, floating leaves truncate at base. III. ii. Roadside towards Palmones Pinar! (teste *Groves*); a form with small flowers and capillary submerged leaves, near *R. tripartitus.*

R. bullatus L. Rocks and dry ground; locally plentiful; 10–12. I. About Willis's! Ince's Farm! By Charles V.'s Wall near Devil's Gap and Signal Station! North Front, *K.*; not there now. III. i. By Francia's Farm! In profusion near Malaga Gardens! Between San Roque and first Pine Wood! Alcadeza Plains! S. Carbonera, *D.*

†*R. blepharicarpos* Boiss. (*R. spicatus* Desf.? *R. rupestris* Guss. var.?). Carpel-bearing part of receptacle pilose (the lower petal-bearing part is often pilose in *R. flabellatus*), leaves reniform and deeply 3-lobed, the lobes again shallowly lobed or dentate; carpels with a very long beak. I. Europa Flats, near the Artillery Barracks, *Lem.*, *D.* III. i. S. Carbonera, *D.*; San Roque, *Dasoi.*

†*R. Winkleri* Freyn. Similar places; rare? 3–5. Near *R. flabellatus*, but radical leaves suborbicular and cordate, entire or tripartite. Apparently only an extreme form of that species. I. Signal Station Road! III. ii. S. de Palma, *Rev.* Near Algeciras Cemetery. Mountains above Pelayo!

R. flabellatus Desf. (*R. chærophyllus* DC.). Dry grassy places, among bushes, &c.; very common in Spain, occasional on Rock; 3–5. Though typically with oval leaves, more or less narrowed below, it certainly runs into forms described above, connecting it with *R. Winkleri.* My 627, from Signal Station Road, and 361 from Campo Common, are such forms. Thirteen varieties are described, but I cannot identify them, and cite the records of others.

Var. *genuinus* Freyn. I. North Front, *K.* III. i. San Roque, *Wk.* ii. Algeciras, *W.*, *Hack.*, *Winkl.*

†Var. *acinacilobus* Freyn. III. ii. S. de Palma, *Winkl.*

Var. *flavescens* Freyn. III. ii. S. de Palma, *Winkl.*

†Var. *gregarius* Freyn. III. ii. S. de Palma, *Winkl.*

†Var. *confertus* Freyn. III. i. Damp pastures at San Roque and S. Carbonera, *Winkl.* ii. Algeciras, *Winkl.*

Var. *mollis* Freyn. III. ii. Algeciras, *Dieck.* San Roque.

Var. *acutilobus* Freyn. III. i. Spanish Racecourse, *K.*, *D.* ii. S. de Palma, *Fritze.*

R. gramineus L. Dry grassy places; rare; 3–6. III. i. About Campamento, *K.*

†*R. ophioglossifolius* Vill. Marshes; rather frequent; 2–6. III. i. Cork Wood Sotos! Lajo Marshes! Sand desert below S. Carbonera, *Boiss.*, *Wk.*, *D.* ii. S. de Palma, *Winkl.* iii. Near Salt Pans! Between Guadacorte and Guadarranque River!

†*R. sceleratus* L. Marshes; rare; 2–5. III. i. Mill Soto; sparingly!

R. palustris Sm. Damp grassy places and stream beds; very common; 4–5. The aggregate covers the common species with large very hirsute leaves, but it varies much in hispidity, and to a less degree in leaf cutting.

Var. *macrophyllus* P. L. is the common variety, more or less densely clothed with yellowish hair, peduncles hairy, terete, sepals spreading or ascending, carpel beak recurved. My 1757, from near Cortijo Trinidad, is a peculiar variety with longly petiolulate central leaf-segments; it is like *R. Aleæ* Wk., but the root is hardly subbulbous. III.!

Var. *adscendens* P. L. Much more glabrous, leaves, especially upper, more cut into narrower segments; sepals more strongly reflexed. A very local variety. A distinction is made by many botanists between *R. adscendens* of Brotero's Fl. Lus. p. 370, and Phyt. Lus. ii. p. 229; but the author obviously intended these to be the same. There is, consequently, some confusion of names, and I suspect that Perez Lara's records of *R. Broteri* refer to var. *macrophyllus*. III. i. Soto behind Long Stables! (I believe this variety, but not collected). iii. Guadarranque marshes, plentiful!

[*R. Steveni* Andr. †var. *multifidus* Amo is recorded by Dautez from the Guadarranque marshes. The last-named variety, which he does not record, bears a superficial resemblance to it.]

R. trilobus Desf. Similar or drier situations; very common; 3–5. Usually glabrous, flowers half the size of those of *R. Sardous*. A dwarf form is found on the summit of the Frayle ridge at 2500 ft. or more. II.! III.!

[*R. Sardous* Cr. is recorded by Dautez from Neutral Ground and foot of S. Carbonera. Probably he mistook *R. trilobus* for it.]

R. parviflorus L. Shady banks and grassy places; locally frequent; 4–5. III. i. From Second Venta to Long Stables and Almoraima! ii. Between M. de la Torre and Palmones railway bridge! Mountains!

R. muricatus L. Damp grassy and marshy places; rather common; 3–5. II.! III.!

R. arvensis L. Cornfields; very common; 3–5. III.!

Ficaria ranunculoides Moench. var. *grandiflora* P. L. Marshy and damp fields and woods; very common; 12–4. Much larger than type, with conspicuously reticulate leaves. I have not seen type, nor has Perez Lara in the Province; but he cites Amo's record, "the neighbourhood of Gibraltar." II.! III.!

Adonis autumnalis L. Cornfields; rare; 4–5. III. i. Between San Roque and Alcadeza Crags!

Anemone palmata L. Dry heathy places and open parts of woods; rather common; 2–5. III. i. and ii.!

†*A. coronaria* L. forma *micrantha* Daut. & Deb. Woods; locally common; 3. Much more slender in all parts than type, leaves with narrower divisions; flowers smaller and deeper blue. III. i. Almoraima Woods, *Deb.* I have twice searched for it without success; it is doubtless very local. S. Carbonera, *Rev.*

PAPAVERACEÆ.

[*Papaver somniferum* L. var. *setigerum* Boiss. occurs as an occasional escape, as on North Front and at Linea !]

P. Rhœas L. Cornfields, or undisturbed ground; rather common; 4–5. I.! III. i. and ii.! In occasional fields abundant!

P. dubium L. Similar places; much less frequent; 4–5, Starved specimens of the last are liable to be mistaken for it. I! III. i. and ii.!

[†*P. Argemone* L. is recorded by Kelaart for Gibraltar, but has not been confirmed.]

P. hybridum L. Cornfields and their borders; locally frequent; 4-5. I. Engineer Road! III. i. By First Pine Wood! Campamento! Carteian Hills! Magazine Hill! ii. In several places!

Glaucium luteum Scop. Sea shores, chiefly on the Rock; 4–5. I. Eastern and southern shores! Dockyard! Above Alameda (herb. Balestrino!) II.! III. ii. Carnero Point!

[*Rœmeria hybrida* DC. Waste places near the sea; casual? 4–6. III. i. Campamento, *Frere.*]

FUMARIACEÆ.

Fumaria capreolata L. Hedges and bushes; rather frequent; 2–5. Flowers creamy white with dark red tips, fruit pedicels recurved. I. Main Road from Charles V.'s Gate to Europa Pass! Engineer Road! North Front gardens! Reclamation Road! II.! III.!

Var. *speciosa* Hamm. Flowers turning deep crimson as soon as they open. III. i. Cachon! Shore near Puente Mayorga! Road to Bonel's Farm! iii. Between Guadarranque and Algeciras, *D.*

F. macrosepala Boiss. Bushy places; rare. Flowers pale, very large, sepals twice as broad as corolla, stem simple, hardly climbing. I. Under north-east precipice among Chamærops, *Boiss.*

[*F. malacitana* Haussn. Recorded by Dasoi from Gibraltar, but Mr. Pugsley thinks the determination untrustworthy.]

F. sepium B. & R. Hedges; rare; 2-5. Mr. Pugsley says that author's specimens of this are only shade grown *F. gaditana*, with narrow sepals and corolla, and bracts as long as pedicels; but the name takes priority as a species. III. ii. Hedges and walks north of Algeciras, *B. & R.* My 1711 from Algeciras Alameda, doubtless the station referred to, agrees with the type specimen (*teste* Pugsley)!

Var. *gaditana* Pugsley differs from *F. capreolata* in erect pedicels and smaller flowers in a lax raceme. From other species it differs in very broad sepals, lax, usually few-flowered racemes, deflexed lower petal, and smoothish fruit. I.! III.! Common everywhere!

F. Bastardi Bor. Similar situations! rare; 2–5. Lower petals with spreading magins, upper laterally compressed, fruit subglobose. I. *Boiss.*, *D.* North Front Gardens! III. i. Road to Bonel's Farm!

[*F. muralis* Sond. and *F. Borœi* Jord. are reported from Gibraltar and San Roque. Mr. Pugsley thinks they are certainly forms of *F. sepium.*]

F. agraria Lag. Roadsides and hedges; locally frequent; 2–5. Like *F. capreolata* in yellowish colour of flowers, but they are larger, very broadly winged, pedicels erect or spreading, and fruit large, coarsely rugose. I. Bruce's and Ince's Farms! III. i. Linea! Campamento! Puente Mayorga! Carteian Hills! Near First Pine Wood! ii. Railway, &c., about Algeciras!

†*F. arundana* Boiss. A shade form of *F. rupestris* B. & R. (*teste* Pugsley). Rocky ground; rare; 3–5. Allied to last, but flowers long, narrow, very broadly winged, sepals narrow, and fruit smaller. III. ii. Shady fissures above Algeciras, *Coss.*

F. officinalis L. Waste and cultivated ground; rare; 2–5. Leaf segments narrow, flowers small, dull coloured, upper petals with spreading, not ascending, margins, lower decidedly spathulate, fruit small, truncate or enarginate. I. Rare, *K.* III. i. Abundant about San Roque and Algeciras, *K.* By Pinar de los Bigotes!

F. parviflora Lamk. Similar places; rare; 2–5. Leaf segments narrow-linear, sepals minute, fruit rounded or subacute. I. *Boiss.* Kelaart says this species is "not quite so common" on the Rock as *F. capreolata.* It appears to be very rare, but is abundant elsewhere in the Province.

CRUCIFERÆ.

Malcolmia littorea R. Br. Sand dunes near the sea; abundant; 1–7, or occasionally the whole year. I. Alameda (herb. Balestrino!). It is not likely to occur there now. II.! III.!

Var. *Broussonetii* Boiss. has broader, more sinuate leaves, but it runs into type, and broad leaves are not always associated with deeper sinuation. I.! II.! III.!

M. lacera DC. Similar situations; rare; 2–6. I. Maritime sands at Gibraltar, *Wk.*, *Winkl.* This might be at Catalan Bay, North Front, or Neutral Ground.

†*Matthiola sinuata* R. Br. Similar situations; rare; 5–6. II. Near the frontier line, *D.* III. i. Sand desert, *D.*

†*M. tricuspidata* R. Br. Similar situations; locally common; 3–6. I. North Front! II.! III. i. Foot of San Roque, *D.*

[*Hesperis matronalis* Lamk. Found on the Rock by Lemann, but probably a garden escape.]

Sisymbrium officinale Scop. Roadsides, fields, and waste places; very common; 4-5. The glabrous form occurs rather frequently. I.! II.! III.!

S. Irio L. Old walls and waste places; formerly common, now rare; 2–6. I. *K.*, *D.* Racecourse!

[*S. Columnæ* Jacq. occurs as a casual on the Glacis and near the Cemetery!]

[*S. austriacum* Jacq. A casual by Reclamation Road! My specimen has long virgate racemes of very spreading pods longer than their pedicels, but usually the pods are suberect and shorter.]

Nasturtium officinale Scop. Watercourses; frequent; 2–6. Large forms are probably var. *siifolium* Steud. III.!

†*N. hispanicum* B. & R. By streams; locally common? 3–6. Flowers small, yellow, pods oblong, subinflated. III. i. Abundantly by a tributary of the Guadarranque near San Roque, *K.*

Arabis hirsuta Scop. Dry rough places; rare; 4–6. III. i. Alcadeza Crags!

Cardamine hirsuta L. Rather shady bushy ground; frequent; 1–3. I. Mediterranean Steps! Breakneck Battery! Middle Hill! III.!

†*Succowia balearica* Med. Rocky *débris*; locally frequent; 2–4. I. Foot of north, north-east and north-west precipices! Monkey's Cave! Above Mediterranean Tunnels! Spur Battery! At foot of San Roque, *D.*

[*Sinapis alba* L. is recorded by Kelaart for Gibraltar, doubtless a casual.]

[*S. arvensis* L. Waste and cultivated land; casual? 3–6. I. *K.*, *D.*]

†*Brassica lævigata* Lag. Sandy ground; rare; 3–5. Usually with a radical rosette of deeply pinnatifid leaves, with several broad dentate segments; but my gathering has several narrow elongate subentire stem leaves. Flowers rather large, racemes becoming very lax, with long-beaked pods on long pedicels, valves one-ribbed. III. ii. Lane at Palmones Playazo!

B. sabularia Brot. Sandy places, chiefly in open woods; locally common; 2–5. III. i. Both Pine Woods! Cork Woods! ii. Palmones Pinar!

†Var. *papillaris* Boiss. Perennial? many-stemmed, with spiny white setæ all over, except pods; leaves less deeply divided, beak conical, 1–2-seeded. I have failed to find this or type in its only station, and fear that alterations have exterminated it. I. Slopes over Catalan Bay, *Boiss.*, *D.*, &c.

†*B. Tournefortii* Gouan. Waste sandy ground; rare; 3–4. Like last but flowers small, purplish, veined with deeper purple, beak of pods longer, about equal valves. III. i. Sands at foot of Fort San Felipe, *D.* Fields by shore at foot of San Roque, *D.* (A dwarf form at these two stations, *Deb.*) ii. Heath near Palmones Pinar, 2–3 ft. high!

†*B. fruticulosa* Cyr. Rocky and rough places; rare; 3–6. Perennial, with rounded subcrenate leaf lobes. I? *D.* ex P. L. Fl. p. 641. Dautez does not record it from the Rock in Debeaux,

but the latter comments on its existence there in his notes. III. i. Precipices at San Roque, *D.* By San Roque Alameda!

Erucastrum incanum Koch (*Brassica adpressa* Boiss.). Roadsides and waste places; abundant; 3–6. I.! II.! III.!

Diplotaxis erucoides DC. Sandy or cultivated fields; rare; 1–6. Flowers white, claws violet. I. *D.* III. i. and ii. San Roque and Algeciras, *D.*

D. virgata DC. Uncultivated and sandy ground; rare? 11–6. Distinguished from next two by much less lobed leaves; lobes usually few and shallow, often reduced to teeth. III. i. San Roque, *Ball.* ii. Algeciras, *Clem.*

D. siifolia Kunze. Similar situations; very common? 11–6. I cannot distinguish between this species and the next—descriptions hardly differentiate them. One of the two is abundant, often in large masses. It varies almost indefinitely in size and leaf-lobing. I. Lower parts, chiefly in grassy places! II.! III.!

D. catholica DC. Similar situations; rare—at least in the Province generally; 11–6. III. i. Between Gibraltar and San Roque, *Pourr.*

Raphanus Raphanistrum L. Dry open ground; abundant; 1–5. Not an escape at Gibraltar, as Debeaux suggests; it is obviously native over the whole region. I.! II.! III.! My 1729 from railside near Almoraima is a large and handsome form.

Crambe filiformis Jacq. Stony *débris*, usually in mountains; rare; 5–8. III. i. South slopes of San Roque, *D.* ii. A single plant by railway near Algeciras!

Rapistrum rugosum All. Fields and waste places; abundant; 3–5. Closely resembles *Erucastrum incanum*, except in fruit. Var. *glabrum* Host, with glabrous fruit, occurs commonly. I.! II.! III.!

Biscutella apula L. var. *microcarpa* Boiss. Sandy or gravelly fields; frequent; 2–5. Annual, flowers rather pale yellow, locules 1½ lines in diameter, hispid. I. South and west slopes, *K.*, *D.* I found this in 1883 near Michael's Cave, but not recently! III. i. and ii.!

Var. *megacarpæa* Boiss. (*B. bætica* B. & R.). Commoner than last with us, but less so elsewhere in the Province. Locules 2–2½ lines in diameter. III. i. and ii.!

B. scutulata B. & R. Heathy ground and open woods; common, often very abundant; 2–5. Flowers small, deep yellow, fruit smooth, locules 1 line in diameter, filaments broadly winged. This and the last seldom grow together. III. i. and ii.! Very abundant in Waterfall Valley!

B. lævigata L. Heathy and rocky places in woods; locally frequent; 3–5. Perennial, leaves thin, subglabrous. III. i. Cork Wood and Alcadeza Crags!

Var. *tomentosa* Amo (*B. montana* Cav.). Rocky bushy ground; locally common; 2–5. Leaves thick, pilose. I.!

†*Iberis gibraltarica* L. Bushy rocky ground; locally common; 2–5. I.!

I. contracta Pers. Similar places and bushy sandy ground;

locally common; 6–7. Perennial, slender and straggling, with long lax branches and linear leaves. III. i. Cork Wood Crags and rough ground below!

I. pectinata Boiss. Rough bushy slopes; locally rather common; 4–6. III. i. South slopes of San Roque, *D.* Cork Wood Crags! Alcadeza Crags, a form with entire leaves, resembling *I. ciliata* All! Perez Lara remarks on its polymorphism.

[*I. umbellata* L. was collected by Reverchon in S. de Palma, doubtless as an escape.]

Teesdalea Lepidium DC. Open sandy and gravelly places; locally common; 12–2. III. i. All over Bonel's Farm to summit of Chair! Malaga Gardens! Cork Woods! ii. Heath near Palmones Pinar!

Capsella Bursa-pastoris Moench. Roadsides and waste places; common; 1–4. I.! II.! III.!

**Lepidium Draba* L. Roadsides and waste places; rare; 3–6. I. *Débris* of forts, &c., even in the town, *D.* III. About San Roque! ii. A single plant near Carnero Point!

L. latifolium DC. River banks and marshes; rare; 5. III. iii. By Palmones River!

Senebiera Coronopus Poir. Waste places, mostly near buildings; rather frequent; 4–6. I. Rosia Parade! II. *D.* III. i. Campamento and roadside beyond! San Roque! Near upper ford on Lajo! ii. M. de la Torre! Algeciras!

S. didyma Pers. Similar places; less frequent; 4–6. I. Reclamation Road! Haynes's Foundry, an erect form simulating *Lepidium ruderale* L! Sunnyside Steps, *K.* II. *K.* III. ii. El Cobre!

Lobularia maritima Desv. Rocky and bushy places; very abundant on Rock, rather local elsewhere; 10–5. An annual form, quite distinct from next, grows on slopes before Catalan Bay! A prostrate form near the Pedrera may be var. *densiflora* Lge.! I.! III. i. Andalucian racecourse! Punta Mala! Cork Woods! ii. Palmones Playazo! Carnero Point! iii. Guadacorte!

L. lybica Coss. Sandy ground; very local; 11–1. Annual, not perennial as described. I. Racecourse!

Cakile maritima Scop. Sandy seashores; rather frequent; 3–5, and occasionally the whole year. I. Glacis! Sentry Fence! Beyond Catalan Bay! II.! III. ii. and iii. Mouth of Palmones River, both sides! Sandy Bay!

[CAPPARIDEÆ.

Capparis spinosa L. An occasional escape, but looks quite native in Palmones Sands!]

CISTACEÆ.

Cistus albidus L. Bushy hill slopes and valleys; rather locally common; 2–5. I. Above Mediterranean Road! III. i. Arroyo Viejo! Alcadeza Crags! Pine Wood Plains! Cork Woods, chiefly crags and ravines!

C. crispus L. Bushy places and heaths; common; 4–6; III. i. and ii.! Reaches Carnero Point!

C. monspeliensis L. Bushy places and woods; locally common; 4–5. III. i. Alcadeza Crags and Ravine! First Pine Wood! This may be the species referred to by Kelaart (Fl. p. 161) as *Helianthemum monspeliacum*, found by him on Queen of Spain's Chair.

C. salviæfolius L. Bushy places; common; 2–5. Its pure white flowers turn quite yellow in drying. I. Over Mediterranean Road! III. i. and ii.! Reaches Carnero Point!

C. populifolius L. Bushy and rocky places on mountains; rather locally plentiful; 4–5. III. i. Summit of Queen of Spain's Chair! Alcadeza Crags! ii. Mountains!

Var. *lasiocalyx* Wk., with a very pilose calyx, is perhaps commoner than type. III. i. Queen of Spain's Chair! Almoraima, *Schott*. ii. Mountains!

C. ladaniferus L. Hilly woods; rare, though frequent beyond our limits; 3–5. III. i. First Pine Wood, two or three bushes!

C. Bourgeanus Coss. Bushy heaths and in woods; locally abundant; 5–6. Flowers white, more or less whorled, on long pedicels. Like a *Halimium*, and closely resembling *H. umbellatum*, but quite glabrous and leaves longer. III. i. Pine Wood Plains! Between Almoraima and Long Stables!

Halimium Libanotis Lge. Sandy plains, heaths and woods; locally abundant; 2–5. Low, densely covered with unspotted yellow flowers. My only gathering, from Palmones Playazo, is of a broader leaved form than type. III. i. Cork Woods! Pine Wood Plains! Alcadeza! ii. Palmones Playazo!

H. halimifolium Wk. Bushy hill slopes and woods; rather locally abundant; 5–6. Tall, leaves finely white-silky, flowers spotted or not. Varies considerably in habit and stature. II. *D.* Not there now. III. i. North-east slopes of Chair! Cork Woods! Pine Wood and Alcadeza Plains!

Var. *crispatum* Wk. Leaves smaller, undulate, epicalyx longer, filaments purple, not yellow. III. ii. S. de Palma, *B. & R.*

H. eriocephalum Wk. var. *asperrimum* Wk. (*H. lasianthum* Pers.). Bushy and heathy mountain slopes; locally common; 1–5. Flowers rather large, golden yellow, not spotted, on very short lateral branches of straggly main stems. III. i. Almoraima *Wk.* ii. Mountains! M. de la Torre!

†*H. formosum* Wk. Similar places; rare; 4–5. Peduncles much longer than in last, petals usually spotted. III. ii. S. de Palma in Los Barrios district, *Winkl.*

Tuberaria vulgaris Wk. Sandy heaths and in mountains; very common; 3–5. III. i. and ii.!

T. variabilis Wk. (*Helianthemum guttatum* Mill.). Sandy and gravelly heaths and fields; very common; 2–6. III.!

Var. *plantaginea* Wk. Larger and stouter, more branched, leaves much broader, petals usually, not always, spotted. Common. III.!

†Var. *Cavanillesii* Wk. Viscid pubescent, petals often un-

spotted. III. i. Sandy grassy places at foot of San Roque, and on S. Carbonera, *D.*

†Var. *Linnæi* Wk. Petals with a very large spot, forming a dark eye. III. i. North of Alcadeza Crags, rarely!

Var. *inconspicua* P. L. Flowers very small, on longish pedicels, petals not longer than calyx. I. Maritime sands on north and west coasts, *D.* III. i. About San Roque, *B. & R.* Valley south of Long Stables! Pinar del Rey, *Porta & Rigo*!, labelled *T. bupleurifolia* Wk.

Var. *brevipes* P. L. Pedicels much shorter than calyx, petals spotted. III. i. Near Almoraima, *B. & R.*

T. macrosepala Wk. Similar situations; frequent; 4–6. Epicalyx much larger and more hirsute. Varies considerably in size of flower, petals sometimes spotted. III. i. and ii.! iii. Sands at Guadacorte!

T. echioides Wk. Similar places; rather rare; 4–6. Very hairy, racemes dense, flowers subsessile, epicalyx very large. III. i. About Gibraltar and San Roque, *B. & R.* Cork Woods and Crags! ii. Algeciras, *Schott.*

Helianthemum ledifolium Thib. Sandy and gravelly places and path sides; very local; 4–5. Coarse, erect, petals pale, very deciduous, capsule very large, trigonous, shining. III. i. Malaga Gardens! Pinar de los Bigotes to San Roque Bull-ring!

H. intermedium Thib. Dry gravelly places; very local; 2–3. Slender, annual, fruit pedicels divaricate, upcurved. The earliest species. Perez Lara makes it a var. of *H. salicifolium* with smaller petals or none, and sepals twisted after, as well as before, flowering. III. i. Path to First Pine Wood, and beyond the wood! Malaga Gardens! iii. Near Guadacorte!

H. ægyptiacum Mill. Similar places; rare; 3–4. Resembles last, but pedicels reflexed after flowering; sepals translucent, and petals pale yellow. III. i. Between Pinar de los Bigotes and Magazine Hill! Foot of San Roque, *Wk.*

†*H. glaucum* Boiss. Dry rocky slopes; locally common; 3–6 Dwarf, cæspitose, ashy green, with bright yellow petals. III. i. Cork Wood Crags!

†Var. *erectum* Wk. is taller and more virgate, with narrower more revolute leaves. III. i. With type, but rarer!

H. lavandulæfolium DC. Bushy places on hills; rather locally common; 4–6. Stems virgate, suberect from a straggly woody base, leaves narrow, strongly revolute. III. i. Cork Wood Crags! Between Malaga Gardens and Alcadeza Crags! Between San Roque and S. Lorca! South slopes of San Roque, *D.*

†*H. origanifolium* Lamk. Rocky places; very local and rather scarce; 4–6. Dwarf, intricately branched, leaves small, dark green, petals deep bright yellow. The closely allied *H. marifolium* DC. has leaves more cordate at base, and incanous, not green, beneath. I. Over Mediterranean Road!

Fumana glutinosa Boiss. Sandy and gravelly heaths and slopes; very common; 2–6. I. *Wk.* West slopes, *D.* III. i. and ii.!

Var. *juniperina* Wk. Stems not glutinous above, leaves more acute, is much rarer. III. i. Near San Roque, *Wk.* Cork Wood Crags ! ?

F. lævipes Spach. Similar places ; rare ; 3–5. Almost wholly glabrous, leaves filiform. III. ii. About Algeciras, *Clem.* Perez Lara has found it near Tarifa, but does not record it elsewhere.

FRANKENIACEÆ.

Frankenia pulverulenta L. Sandy or muddy ground near sea ; rare ; 4–6. I. Roadside at Governor's Cottage ! Europa Lighthouse ! II. *D.*

F. hirsuta L. (*F. lævis* L.). Similar places ; locally common ; 5–6. I. Rocks at Windmill Hill, *K.*, *D.* II. In great abundance, *K.*, *D.* Certainly not abundant there now ; I have not found it, nor on North Front. III. ii. Stream south of Algeciras ! iii. By Aguacorte above Palmones !

Var. *intermedia* Boiss. has puberulous stems. I. Governor's Cottage ! Lighthouse ! Europa Glacis !

DROSERACEÆ.

Drosophyllum lusitanicum Lamk. Bushy hill and mountain slopes ; frequent ; 4–5. III. i. North slopes of Queen of Spain's Chair ! Alcadeza Crags ! ii. Mountains !

VIOLARIEÆ.

Viola odorata L. Damp grassy places among bushes ; very local ; 1–3. III. ii. Among *Nerium* below El Cobre !

V. arborescens L. Sandy and rocky hills ; rare ; 12–4. III. i. About San Roque, *Brouss.* [Near Tarifa, *Clem.* ; beyond our limits.]

V. arvensis Murr. Sandy ground among *Pteris*, &c. ; locally frequent ; 2–4. III. i. About Almoraima and Long Stables !

POLYGALACEÆ.

Brachytropis microphylla Wk. Heathy places on mountains ; locally common ; 1–5. III. ii. Mountains !

Polygala rupestris Pourr. Rocks on mountains ; rare ; 1–6. Our plant is f. *angustifolia* Deb., with longer narrower leaves and more canescent branches than type. I. Mediterranean Tunnels ! Near Michael's Cave ! Beyond Catalan Bay !

P. monspeliaca L. Dry pastures ; frequent ; 3–5. III. i. Carteian Hills ! Opposite Francia's Farm ! Foot of Queen of Spain's Chair ! Near Alcadeza ! ii. About Pelayo ! Carnero Hills ! Hills round Algeciras !

P. bætica Ek. Heathy places on mountains ; rather frequent ; 2–5. III. i. Queen of Spain's Chair ! Cork Woods ! ii. Mountains ! With reddish purple flowers on neck over Pelayo !

RESEDACEÆ.

†*Reseda alba* L. Roadsides and waste places ; locally common ; 2–6. Var. *undulata* Lge. has approximate, much undulate leaf segments, but in all I have seen they are flat or undulate, inde-

pendent of their spacing or width, which vary greatly. I. Rock and North Front! III. ii. Near Algeciras, *P. L.*

[*R. undata* L. Reported by Kelaart from the Rock; probably synonymous with *R. bætica* Gay, which is reported from several up-country stations.]

†*R. propinqua* R. Br. (*R. Gayana* Boiss.?). Sandy ground; very rare; 5. Much more slender, with smaller more sessile flowers, and much smaller pods. II. *D.* I have searched several times in vain for it, but have seen none of the genus there.

R. lutea L. Cultivated fields and roadsides; locally common; 4–6. Debeaux only admits var. *minor* Mull., but all the examples I have seen are at least as tall, and often taller, than type—often 2 feet high. I. *K.* Kelaart doubts its nativity, but it is usually a weed of cultivation. III. i. Between Campamento and San Roque! First Venta! About Pinar de los Bigotes!

R. media Lag. Among bushes on rough ground and on mountains; common; 2–6. Confounded with *R. Phyteuma* L., but differs in sepals not accrescent after flowering, and filaments subulate, not dilated upwards. I. West slopes, *Amo*, *D.* III. i. and ii.! In profusion on mountains after a fire!

R. Luteola L. Disturbed waste ground; rather frequent; 3–6. Var. *Gussonei* Mull. (*R. Luteola* f. *robusta* Daut. & Deb.) is the only form admitted by Debeaux, taller, up to 4 ft., with long adpressed lateral branches and large flowers, but the type is more frequent. I.! II. Rare! III. i. and ii.!

Astrocarpus Clusii J. Gay var. *spathulæfolius* G. & G. Heathy places; frequent or common; 3–6. III. i.! ii. Palmones Pinar! iii. Palmones Village!

CARYOPHYLLACEÆ.

Tunica velutina Fisch. & Mey. Dry gravelly places, woods and mountains; frequent; 4–6. III. i. Queen of Spain's Chair! Alcadeza! Cork Woods! ii. By railway in several places! M. de la Torre! Mountains!

T. prolifera Scop. Similar places; less frequent; 5–6. Stems glabrous, leaf sheaths shorter. Perez Lara describes a third species, *T.* (*Kohlrauschia*) *pinetorum*, with intermediate characters, and suspects that the Queen of Spain's Chair plant, which he has not seen, may belong to it. I. Mediterranean Steps! Dockyard! III. i.! "In great abundance on the Queen of Spain's Chair and Cork Woods," *K.* Neither species is abundant, but *T. velutina* is certainly the commoner. ii. Near Cortijo Trinidad! iii. Palmones Sands!

†*Dianthus lusitanicus* Brot. (*teste* F. N. Williams). Dry heaths; rare; 6-7. Petals notched, not incised, leaves slender, green. III. i. Between Malaga Gardens and S. Lorca!

D. Broteri B. & R. var. *brachyphyllus* Wk. Dry banks and rocky places; rare; 6–7. Petals fimbriate. The var. is more cæspitose, leaves shorter, stiffer, and calyx shorter, with 8–12, not 6 scales. I. *Rev.* III. i. Lane beyond Bonel's Farm! Lower mountain region of San Roque, *D.*

†*D. Caryophyllus* L. Rocks; locally frequent; 5–7. It often has six bracts as in *D. Boissieri*, instead of four, as described. I. Upper parts from north to south, above 600 ft!

D. Boissieri Wk. Rocks; very rare; 5–8. There is much dispute as to the name of this species, but all authors regard it as distinct from last. Kelaart identified it with *D. sylvestris* Wulf. (Boiss?), which Perez Lara makes synonymous with *D. virgineus* G. & G., *D. Boissieri* Wk., and *D. longicaulis* Ten. It has half-included, non-contiguous, smaller petals than last, and slight differences in sepals. I have never seen a specimen. I. Precipices over St. George's Hall, *K.*, *D.*

†*Velezia rigida* L. Dry gravelly heaths; rare? 5–6. III. i. Path to First Pine Wood!

Eudyanthe Cœli-rosa Reichb. Grassy and bushy places; occasional; 5–6. III. i. Alcadeza Crags! Wooded slopes of San Roque, *Boiss.* ii. By the Miel and fields below El Cobre! Carnero Hills!

E. læta Reichb. Marshy places; rather common; 3–6. III.!

Melandrium microcarpum Wk. Bushy places; rather frequent; 3-6. Corolla slightly cream-coloured, often decidedly so on back; capsule teeth erect or slightly spreading, not revolute, but often scaphiform at apex so as to appear inflexed, seeds grey, laterally compressed, quite rounded on back, punctate in rows. I doubt its being more than a variety of *M. pratense* Rohl., with a larger, more globose capsule. I. Mediterranean Steps! Middle Hill! Near Signal Station! Haynes's Cave! &c. III. i. Queen of Spain's Chair! Alcadeza Crags! Cork Woods! ii. Waterfall Valley! Slopes over Pelayo! Palmones Playazo!

Silene gallica L. Sandy fields, roadsides and waste places; very common; 3–5. Varies greatly in size and colour of flowers, corolla sometimes almost obsolete, or large and conspicuous, white or rose. I.! II.! III.!

S. cerastioides L. Similar places; rare? 4–5. Very like last, but never viscid, petals deeper rose and bipartite, calyx veins anastomosing, teeth longer and narrower. I. *Colm.* i. Road to S. Lorca! ii. Algeciras, *Née.*

S. nocturna L. Roadsides and gravelly places; frequent; 3–5. Usually apetalous (var. *permixta* Jord.), then known from *S. apetala* by wingless seeds and long cylindrical calyx. I. Mediterranean Steps! Engineer Road! Commercial Mole! Europe Flats! III. i. and iii.! ii. Railside near M. de la Torre! My 1694 and 1840, common on mountains after a fire, with bright purple petals, greenish on back, and longer carpophore than usual, are probably this.

S. hirsuta Lag. Sandy and heathy places; very common; 3–6. Petals bright rose, calyx with very long spreading hairs, tube long and narrow, curved up, seeds wingless. II. *D.*, *Schott.* III.!

†*S. mogadorensis* Coss. & Ball. Sandy ground; rare; 4–5. "Aspect of *S. obtusifolia*, but glandular pubescent, with narrower leaves. Flowers purple. Calyx not contracted at mouth, teeth oval, subobtuse; anthophore more than half as long as capsule.

Calyx truncate, umbilicate, scarcely veined, constricted below, seeds strongly striate, obtusely channeled on back." III. ii. Algeciras, *Porta & Rigo.*

†*S. obtusifolia* Willd. Rocky *débris* and stony ground; locally common; 2–4. Petals not white, as described, but dingy rose or purple, always so on back, leaves broad, obtuse, thickish, seeds wingless. I. North-western slopes from Farringdon's to Rock Gun! Governor's Cottage! Dockyard! *Débris* slopes below Galleries! III. ii. Carnero Point! Probably Reverchon's "Algeciras" Station.

†*S. vespertina* Retz. Grassy banks; rare; 4–5. Petals bright rose, like those of *S. hirsuta*, but calyx less hirsute, and constricted at apex in fruit. Flowers rather crowded at end of branches, often with a flower in the fork. I. "On a small bank to the right" of the Inundation? (*K.*, Fl. p. 67). Many alterations have been made since Kelaart's day, and his station is not clear. III. i. Sandy fields near Spanish racecourse, *K.*, *D.*

S. micropetala Lge. (*S. vestita* Soy-Willm. & Godr.). Sandy ground; rare; 4–5. Petals small, bright rose, not white as described, calyx cylindrical, quite erect in fruit, not constricted at mouth, with anastomosing veins, and closely adpressed silky hairs, seeds with flat not excavate face. III. i. Near San Roque, *Schott.* Second Pine Wood! ii. Palmones Playazo! iii. Palmones Sands!

S. littorea Broth. (*S. villosa* Forsk.?). Sand-dunes; locally frequent; 3–5. Dwarf, 2–3 in. high. Flowers large, bright rose. Only recorded elsewhere from Tarifa. I. Catalan Bay! II., *K.* III. ii. Palmones Playazo! Sandy Bay!

S. colorata Poir. Dry rocky slopes and stony places; occasional; 2–5. Resembles both *S. obtusifolia* and *S. hirsuta*, but differs from both in winged seeds. From *S. obtusifolia* its bright rose flowers distinguish it, and from *S. hirsuta* its broader leaves and calyx tube, becoming campanulate in fruit. III. iii. Guadacorte!

Var. *lasiocalyx* Soy-Willm. & Godr. has a longly hirsute calyx, and is much the commoner. I. Below Mediterranean Road! II. i. Sand-dunes at foot of S. Carbonera, *K. D.* ii. Roadside towards Puente de los Pastores! Siding near M. de la Torre?

S. longicaulis Pourr. Sandy heaths and open woods; rather rare; 2–5. Not at all like *S. apetala*, as Perez Lara thinks, much taller, usually unbranched and few-flowered, petals exserted dull purple, seeds winged. III. i. Second Pine Wood! ii. Palmones Pinar and Heath!

S. apetala Willd. Roadsides, walls and waste places; locally frequent; 2–4. Apetalous, short, much branched, fruit calyx broad, campanulate. I. Willis's and Michael's Cave! III. i. Path to First Pine Wood! ii. Algeciras Station!

S. nicæensis All. Sand-dunes; very common; 1–12. I.! II.! III.!

S. rubella L. Sandy fields or grassy places; rare; 2–5. Flowers bright rose, cymes short, more or less compact, calyx very finely adpressed puberulous, appearing glabrous, often reddish. III. i. Cornfield by the Cagancha, near San Roque!

S. portensis L. Sand-dunes; rare; 6–8. Very slender, much branched from the base, leaves very narrow-linear, flowers in dichotomous cymes, calyx elongate, not contracted at mouth in fruit, carpophore long, seeds flat on face and back. III. ii. Near Palmones River, *Rev.*

S. inaperta L. Sandy hills; rare; 5–6. Resembling last, but minutely pubescent, less branched from base, fruit calyx much shorter, carpophore shorter, seeds channelled on back. III. i. Foot of San Roque and of S. Carbonera, *D.*

S. stricta L. Dry, gravelly, or sandy places; rare; 5–6. Very viscid, leafy nearly to top, panicle branching, fruit calyx contracted at mouth, truncate at base, ribs narrowly winged, petals bright rose. Closely resembles *S. muscipula* L., which has wingless calyx ribs. III. i. Near San Roque, *Ball.* ii. Algeciras Station!

†*S. nutans* L. (*S. longicilia* Otth.). Dry hills; rare; 4–6. Perennial, flowers nodding, carpophore decidedly shorter than capsule. III. ii. Upper slopes beyond Waterfall, an unusually broad-leaved form! S. de Palma, *Rev.* Leaves of apparently the same species near summit of Frayle ridge!

†*S. mellifera* B. & R. Stony and rocky places; rare; 4–6. Near *S. italica*, but flowers greenish yellow, and calyx only 4–6 lines long, leaves broader. III. i. Alcadeza Crags!

†*S. italica* Pers. Dry banks and rocky ground; rare; 4–6. Perennial, flowers erect in a viscid panicle, carpophore as long as capsule, petals white, calyx 6–7 lines long. III. i. Rocky ravines of San Roque and open places in Cork Woods, *Boiss.*

S. mollissima Sibth. & Sm. (*S. velutina* Pourr.). Rocky fissures and precipices; rare; 4–6. Very softly tomentose, petals white, often red on back, calyx glandular-pubescent, veins anastomosing. I. North and east precipices, *Boiss.*, *Wk.*, *&c.* By Mediterranean Road and west side of Rock, *K.*

†*S. gibraltarica* Boiss. Similar situations; rare; 4–6. Differs in shorter pubescence, pale violet flowers, calyx without veins, viscid, as well as upper part of panicle. Perhaps a variety of last, confined to the Rock and North Africa. I. Inaccessible parts on east side, *Boiss.*, *Wk.*, *&c.* By Mediterranean Road, *K.* I have searched for this in vain over Catalan Bay, where much of the vegetation has been removed from the foot of the precipice in connection with the water catchments.

[*S. conica* L. Recorded by Lagasca from the Rock; probably an error.]

S. inflata Sm. Rough bushy, or cultivated ground and roadsides; rather frequent; 3–5. Debeaux only records var. *angustifolia* DC., which I have not seen. I.! III.!

†*S. commutata* Guss. Similar places; rare? 3–5. Like last, but leaves broader, often subcordate, more fleshy, pedicels longer, calyx more inflated, seeds finely granulated, not tuberculate. III. i. Near San Roque, *Wk.*

†Var. *longifolia* Wk. has all leaves attenuate at base, linear lanceolate, flowers much larger. III. i. San Roque, *Wk.*

**Saponaria officinalis* L. Sandy places and roadsides; usually near cottages; occasional; 5–7. I. Hedges and waste places in the town, *D.* III. i. By Lajo in several places! Lane towards First Venta! iii. Salt Pans! Palmones Village!

S. Vaccaria L. Cultivated clayey or sandy fields; rare; 4–5. III. iii. Between San Roque and Algeciras, *D.*

†*Sagina maritima* Don. Sandy or rocky ground near sea; rather rare, or overlooked; 3–5. Leaves quite obtuse. I. South and west coasts, *Rev.*, *D.* North Front! III. ii. Carnero Point, *P.L.*

S. apetala L. Sandy and gravelly fields; common; and probably general; 3–5. Leaves always, and sepals usually, mucronate. I.! III. ii.! Noted from II., but the plant seen may have been *S. maritima.*

†Var. *capillaris* Lge. Much more branched, elongate and slender. III. ii. Waterfall Valley! S. de Palma, *Rev.*

[*S. procumbens* L. Leaves of what might have been this seen on Glacis and elsewhere, but perhaps only prostrate examples of last.]

†*Alsine tenuifolia* Cr. var. *hybrida* Wk. Dry, gravelly, and rocky places; rather rare; 3–5. Calyx eglandular, leaves outcurved, not strict, taller and less diffusely branched than type, which is not Spanish. I. Mediterranean Steps! Green's Lodge! III. i. Alcadeza Crags! Cork Woods!

A. procumbens Fenzl. Dry rocky places; locally frequent; 3–6. I. Buena Vista to Mediterranean Steps! Engineer Road! Rosia! Above Alameda!

†*Moehringia pentandra* Gay. Damp woods and rocky watercourses; locally common; 2–5. Very near *M. trinervia* Clairv., and perhaps a variety, but sepals shorter than capsule, petals none, stamens about 5 (3–8 in mine), leaves shorter and broader. The nerves vary from three to five in both. III. ii. Waterfall Valley!

Arenaria spathulata Desf. Damp clayey spots in fields and paths; frequent; 2–5. III. i. and ii.!

A. leptoclados Guss. Dry rocky slopes; rather rare; 4 Kelaart's record of *A. serpyllifolia* L., of which many auth consider it a slender variety, doubtless belongs here. Perez Lara thinks all he has seen belong here. I. Near Farringdon's. South and west slopes, *K.* III. i. North slopes Alcadeza Crags!

A. emarginata Brot. Dry sandy plains; common; 2–4. A dwarf inconspicuous annual, with white or rose notched petals. III. i. and ii.!

†*A. algarbiensis* Welw. Similar places? rare; 3–4. A dwarf very slender annual, leaves very narrow, short, petals rather large, white, entire. III. ii. Near Algeciras, *Porta & Rigo.*

A. montana L. Bushy or rocky places on mountains; rare; 4–6. Flowers large, white, leaves lanceolate, glabrous. I. *K.* Unconfirmed, but quite a likely habitat. III. ii. Summit of El Frayle!

Moenchia octandra Gay. Damp grassy and partially shady places; common; 2–4. III. i and ii.! Reaches top of Queen of Spain's Chair!

Cerastium glomeratum Thuill. (*C. viscosum* L.). Roadsides, waste ground, &c., very common; 2–5. Varies much in habit, often apetalous. I.! II.! III.!

†*C. brachypetalum* Desp. Dry gravelly places; rare? 3. More slender, pedicels much longer, usually deflexed in fruit, claws of petals glabrous, or ciliate only at base, capsule one-third longer than calyx. I. Mediterranean Steps! III. i. Path to First Pine Wood! Both *teste* F. N. Williams.

C. Boissieri Gren. Rocks and *débris* on mountains; the type, with densely white-tomentose leaves, rare; 4–5. I. Near Green's Lodge!

†Var. *gibraltaricum* Gren., leaves green, but viscid, is common. I.!

Stellaria media Vill. In all situations; very common; 12–5. I.! II.! III.!

S. neglecta Weihe var. *umbrosa* Opiz. Shady places; probably frequent; 2–5. Elongate, flowers rather large, sepals and pedicels glabrous, rarely slightly pubescent, fruit acutely tuberculate, stamens normally 10, but often 3–5. The type has pubescent pedicels and sepals, and may occur. III. i. Malaga Gardens! iii. Salt Pans! Both *teste* E. S. Marshall.

S. uliginosa Murr. Swampy places; rare; 3–5. III. i. Near summit of Queen of Spain's Chair!

Spergula arvensis L. Sandy and gravelly places; the type rare; 1–5. III. ii. Algeciras, *Wk.*

†Var. *glutinosa* Lge. is canescent and glandular; very common. III.!

Spergularia rubra Pers. var. *longipes* Lge. Sandy fields; common; 1–6. Suberect, straggling, little or not glandular, internodes rather long, stipules narrow, inflorescence lax, leafy, flowers deep rose, seeds not winged. III.!

†Var. *pinguis* Fenzl. (*Lepigonum neglectum* Kind.). Stouter, leaves thicker, cymes glandular, flowers and seeds larger. From the description and synonymy this is surely a var. of *S. marina* Wk. I. Sands at Gibraltar, *K.* III. ii. Cornfields at Algeciras, *Rev.*

†*S. purpurea* Pers. (*S. diandra* Heldr.). Sandy ground; rare? 3–5. Erect, slender, little branched, glabrous except cymes, leaves setaceous, short, flowers large, deep rose, stamens 2–3. II. *D.* III. ii. Marsh at Palmones Playazo!? This form is suberect, rather strict, leaves and internodes long, pedicels long, glandular, sepals very acute, glabrous, petals bright rose, stamens 2–5. Mr. G. C. Druce thinks it may belong here.

†*S. atheniensis* Asch. (*S. campestris* Wk.?). Sandy ground; locally common; 4–5. Prostrate, densely branched, slender and wholly very viscid, leaves very slender, cymes leafless, flowers

small, deep rose. III. ii. By Palmones Railway Bridge! iii. Los Barrios aviation ground!

S. marina Wk. Roadsides, often far from the sea; very common; 3–5. Prostrate, flowers rather small, dull rosy or whitish, in a leafy glandular cyme, some seeds winged. I.! III.!

S. media Pers. (*Arenaria marginata* Fenzl). Salt marshes; occasional; 3–6. Stout, often suberect, rather like a very large form of last, capsules much larger, pedicels longer, seeds all broadly winged. II. *D.* III. i. Mouth of Guadarranque! ii. Palmones Playazo!

†Var. *angustata* Clav. (sub *S. marginata*) has seeds very narrowly winged. III. iii. Guadacorte Marsh!

S. rupestris Lebel. Rocks; rare; 4–6. Perennial, prostrate and densely matted, internodes short, stipules large and long, flowers rather pale rose. I. By Buffadero Gate!

S. fimbriata Boiss. Sandy ground; rare? 2–3. Its description hardly differentiates it from last. I. or II. Sea sand at Gibraltar, *Salzm.* III. ii. Algeciras, *Rev.*

LINACEÆ.

†*Linum gallicum* L. Rough bushy slopes; rather rare; 4–6. I. *Lagasca.* III. i. Queen of Spain's Chair!

L. setaceum Brot. Similar places; frequent; 5–6. I. West slopes, *Boiss.*, *D.* III. i. Queen of Spain's Chair! Path to First Pine Wood! Alcadeza Crags! ii. Hills near El Cobre! Carnero Hills!

L. strictum L. Dry gravelly places and old walls; common; 4-5. I.! II.! III.!

Var. *spicatum* Pers. (var. *axillare* G. & G.). Flowers axillary, in a narrow raceme. Much rarer. I. *Pourr.* III. i. Slopes of San Roque, *Boiss.* By Lajo above Almendral.

L. tenue Desf. Dry fields and banks; very common; 4–12. I. *K.* III.!

†*L. maritimum* L. Maritime rocks; rare; 6–7. Much like last, leaves broader, flowers larger, sepals obovate acute, not lanceolate acuminate. I. Grassy places and rocks at South Point, *Pourr.*, *D.* Kelaart indicates slopes over Engineer Road, below Michael's Cave, as the station for this.

L. angustifolium Huds. Sandy grassy places; abundant; 1–5. I. Cumberland Flank! Rock Gun! Signal Station! III.!

†*L. decumbens* Desf. Grassy places; rare; 4–5. III. i. South slopes of San Roque, *D.*

[*L. usitatissimum* L. Kelaart found this in an uncultivated part of the Rock, but I suspect it was a casual. I have seen it as such in the Dockyard.]

Radiola linoides Gmel. Watercourses and damp banks; locally frequent; 4–6. III. i. Cork Woods above San Roque, *Boiss.* Duke of Kent's Farm, *K.* Queen of Spain's Chair! ii. Waterfall Valley up to 1000 ft.! ii. or iii. Sea sand near Palmones River, *Rev.*

MALVACEÆ.

Malva hispanica L. Dry sandy and stony places; very common; 4–7. I.! III.!

M. sylvestris L. Waste places and roadsides; rather frequent on Rock, much less so in Spain; 3–6. Epicalyx narrow, quite free. I.! III. i. Cachon! Almoraima Station!

M. nicæensis All. Similar places; common; 3–6. Flowers very variable in size. Known from *M. sylvestris* by broader epicalyx and smaller paler rose flowers, and from *M. parviflora* by more deeply lobed leaves, larger flowers, and calyx half covering fruit. Its free epicalyx distinguishes it from *Lavatera cretica.* I.! III.!

[*M. rotundifolia* L. is recorded for Gibraltar by Kelaart and Dautez, and is common according to Debeaux, but I have never seen it. Perez Lara says it is subalpine in S. Spain, and doubts many of the records. Probably *M. parviflora* has been mistaken for it.]

M. parviflora L. Waste ground; common, at least on Rock; 3–6. Carpels glabrous, with flat rugose back, and very acute edges, corolla very small, hardly longer than calyx. I.! II.! III., I believe frequent, but only noted from Punta Mala!

†*Lavatera arborea* L. Rough ground near sea; rare; more frequent formerly? 3–6. I. Rocks and grassy places, also near Signal Station, *K.*, *D.* A single plant at Monkey's Cave!

L. cretica L. Rough and waste places by roadsides and buildings; very common; 4–6. Epicalyx broad, connate at base. I.! II.! III.!

L. Olbia L. Woods and bushy places; rare; 5–6. Shrub, flowers clustered, axillary, leaves with a long terminal lobe. III. Near Gibraltar, *Lagasca.*

Var. *hispida* G. & G. is more hirsute, especially peduncles and calyx, leaves green above, not canescent both sides. III. i. Near Almoraima, *Laguna.* ii. By Lobo in Carnero Hills!

[*L. maritima* Gouan is recorded as abundant on the Rock by Kelaart and Dautez. It does not grow in the neighbourhood. I cannot suggest what species can have been taken for it.]

L. triloba L. Bushy ground; rare; 5–6. A tall shrub, flowers clustered, leaves cordate, orbicular, obsoletely 3-lobed. Winkler named it *L. micans* L., but Perez Lara thinks it belongs here. III. ii. Algeciras, *Winkl.*

L. trimestris L. Sandy fields; very common; 4–6. Erect or prostrate, flowers sometimes white. III.!

Althæa officinalis L. Fresh or salt marshes; locally frequent; 6–7. III. iii. Guadacorte Marshes! Both sides of Salt Pans!

[AURANTIACEÆ.]

[None of the order mentioned by Kelaart is native.]

HYPERICINEÆ.

[*Hypericum hircinum* L. is recorded by Kelaart as an introduced species in Gibraltar, *Lem*!]

H. perfoliatum L. (*H. ciliatum* Lamk.). Bushy places and banks; occasional; 5–6. III. i. Hills over San Roque Station! Cork Woods! ii.! iii. Salt Pans!

H. perforatum L. var. *angustifolium* Gaud. Dry bushy places; common; 5–7. The type does not occur in the province. I. Above Bruce's Farm! III.!

H. undulatum Schousb. var. *bæticum* Lge. Marshy places; locally frequent; 7–8. Not seen in flower; the foliage strongly recalls *H. tetrapterum* Fr. III. i. By Lajo below First Pine Wood! ii. Mountains! iii. Guadacorte Marshes!

H. tomentosum L. Dry banks and fields; common; 6–7. I do not observe much variation in our species; the two varieties cited differ but slightly from type. III. i. and ii.!

Var. *pubescens* P. L. More erect and woolly-villous, not canescent, flowers larger, sepals narrower and more longly acuminate. III. i. Near San Roque, *Boiss.*

Var. *lusitanicum* P. L. Leaves much smaller, hispid, sepals linear-lanceolate, mucronate. III. ii. Algeciras, *Rev.*

†*H. crispum* L. Rough fields; rare; 6–7. III. i. Near First River Ferry! Carteian Hills near Puente Mayorga!

H. humifusum L. Damp grassy fields and watercourses; occasional; 5–7. According to Willkomm our form is var. *australe* Wk., stouter than type, with glandular-dentate sepals, but all I have seen appear to be type. III. i. Queen of Spain's Chair! ii. Mountains!

[MELIACEÆ.]

[*Melia Azedarach* L. is only planted.]

AMPELIDEÆ.

**Vitis vinifera* L. Bushy places, hedges, and by watercourses; frequently quite naturalised; 5–6. I only give stations where it is established. III. i. Plentiful in Cork Wood Sotos! By Lajo below First Pine Wood! First Venta, &c.! ii. Waterfall Valley! Carnero Hills! iii. Guadacorte!

GERANIACEÆ.

Geranium dissectum L. Roadsides, hedge-banks, and grassy places; rather frequent: 2–5. I.! II.! III.!

G. molle L. Similar places; common; 2–5. I.! II.! III.!

†*G. columbinum* L. Woods and shady places; occasional; 4–5. I. Near Signal Station! III. i. About Almoraima and Long Stables! ii. Waterfall Valley, from El Cobre to top; Mountains over Pelayo! M. de la Torre! Carnero Hills!

G. rotundifolium L. Roadsides and waste places; frequent, especially on the Rock; 2–5. I.! III. i. Cachon! Puente Mayorga! About San Roque! First Pine Wood! Malaga Gardens! Almoraima! ii. About Algeciras! iii. Near Guadacorte!

G. Robertianum L. var. *parviflorum* Viv. Shady and bushy places; very common; 3–5. Differs from type, which is found at Tarifa, chiefly in smaller flowers. I.! III.!

Erodium cicutarium L'Hérit. Sandy and gravelly fields and heaths; very common; 12–5. I cannot satisfactorily identify all the forms of this aggregate, which, as such, occurs everywhere. I.! II.! III.!

E. primulaceum Lge. Similar places; very common; 12–5. Our earliest and commonest species, fairly distinct, with several large bright pink flowers, often colouring considerable tracts of ground. III.!

E. Jacquinianum Fisch. & Mey. Similar places; 3–6. Densely pubescent and glandular, leaves shortly densely villous, tripinnatisect, segments small, obtuse, peduncles 2–4-flowered, petals subequal, about as long as calyx, not spotted, carpels without a fold, which the last two have. I. *D.* III. i. Sandy shores by Fort San Felipe, *D.*

Var. *bipinnatum* Parl. Subglabrous, leaves less deeply divided, segments narrower, petals unequal. I. *Brouss.*

E. Salzmanni Del. Similar places; 3–6. Stout, stems dark purple, leaves bipinnatisect, segments narrow, acute, peduncles 6–10-flowered, stout, densely glandular, petals equal, scarcely longer than calyx, not spotted, carpels with a long beak, fold small or none. I. Near Old Mole, *D.* II. *D.* III. i. Bonel's Farm!? Andalucian racecourse!? Both stout forms with considerably divided leaves, and very long carpel beaks.

E. moschatum L'Hérit. Grassy and waste places; abundant; 1–5. I.! III. i. and ii.! Doubtless occurs everywhere.

E. malacoides Willd. Roadsides, banks and bushy places; very common; 2–6. Varies considerably in leaf lobing, and somewhat in colour of flowers. I.! II.! III. i.! Less frequent beyond San Roque. ii.! Rather rare, not seen in mountains.

Var. *subtrilobum* Lge. Leaves tri- or pinnati-lobed, terminal lobe largest, occurs frequently with type. I.! II.! III. i.!

E. laciniatum Willd. Similar places; rare; 4–6. Intermediate between last and next, nearer the latter, but more slender, sepals much shorter, 2–2½ lines instead of 5–6, beak shorter, 1½–2 in., and more slender, carpels without a ridge. I. *K.* Europa Point!? rather near last.

Var. *involucratum* Wk. is stouter, with larger bracts. II. *Wk.*! Willkomm's specimen looks very like *E. Botrys*, but differs in calyx, carpel and beak, and its lower leaves are more entire.

E. Botrys Bertol. Sandy and gravelly places; very common; 3–5. Stems long, straggling, flowers large; dark reddish, often striped deep red, carpels with 2–3 deep furrows, beak 3–4 in. long. [I. *Wk.*] Willkomm's No. 556 labelled "at Gibraltar and between Chiclana and Conil" is certainly *E. laciniatum.* III. i. and ii.!

OXALIDEÆ.

Oxalis corniculata L. Dry banks, path-sides, and by streams; rather frequent; 3–6. I. Below Devil's Gap! Buena Vista!

Below Lunatic Asylum! III. i. Cork Woods! Lajo above San Roque. Arroyo Viejo! Queen of Spain's Chair! ii. Mountains! Algeciras Station and by Miel beyond it! Guadalmeci!

***O. cernua* Thunb. Bushy banks, roadsides, and watercourses; very abundant; 12–4. This species has increased enormously in recent years. I.! III.!

ZYGOPHYLLACEÆ.

Tribulus terrestris L. Sandy ground; local; 5–7. I. North Front! II.! Not "in great abundance," as Kelaart says. III. iii. Palmones, *Rev.*

RUTACEÆ.

Ruta montana Vill. Dry bushy hills; locally rather frequent; 6–7. Leaf segments narrow, flowers bright yellow. III. i. Carteian Hills near San Roque! Towards First Pine Wood! Pinar de los Bigotes! Near Alcadeza Crags!

R. chalepensis L. Dry bushy hills; locally common; 2–6. I.! A form at Levant closely approaches next! III. i. Queen of Spain's Chair! Cork Woods and elsewhere! ii. Thinly scattered on hills and mountains!

R. bracteosa DC. Similar places; common; 2–6. Differs in much broader bracts, and shorter petal fimbriæ. I.? *K.*, who does not record *R. chalepensis*, which he may have mistaken for it. III. i. Carteian Hills! Path to First Pine Wood! Magazine Hill! ii. Carnero Hills!

CORIARIÆ.

Coriaria myrtifolia L. Thickets in marshes and by streams; locally common; 3–6. III. i. Arroyo Viejo and Lajo in many places! Railside beyond Almoraima! iii. Guadacorte Marshes!

RHAMNACEÆ.

Rhamnus Alaternus L. Dry bushy slopes and woods; rather frequent; 12–3. I.! A narrow-leaved form near Signal Station may be the form near *R. integrifolia* mentioned by Kelaart! III. i. Queen of Spain's Chair! Cork Woods! ii. Mountains to highest ridge! Carnero Hills!

R. oleoides L. Rocky bushy places; frequent; 3–5. Leaves oval or elliptical, often small. I.! III. i. San Roque, *Wk.* Queen of Spain's Chair! Cork Woods! ii. S. de Palma, *Wk.* iii. Palmones village, *Laguna.*

Var. *angustifolia* Lge. has linear lanceolate leaves, like those of next, but more rounded on sides. I. Near Windmill Hill Road, *Wk.*, &c. III. i. S. Carbonera, *Wk.*

R. lycioides L.? Similar places; rare; 4-6. Leaves narrow linear, or strap-shaped. Perez Lara thinks the records for the province refer to the last var. I. Communicated, *K.* III. i. and ii. Precipices at San Roque and S. de Palma, *K.*

R. Frangula L. Wooded valleys; locally frequent; 4–6. III. ii. Waterfall Valley!

Var. *longifolia* Rouy is a larger bush or small tree, leaves up to 5 in. long by 3½ in. wide, fruit larger, more obovate, seeds black, not yellow. Grows with type, into which it runs. III. ii.!

ILICINEÆ.

Ilex Aquifolium L. Mountain woods; locally frequent; 4–5. III. ii. From Waterfall to highest ridge, very small bushes, with less spiny leaves than usual, not seen in flower!

Var. *balearica* Wk. (*I. Perado* Ait.). Leaves much larger, usually quite entire. III. ii. S. de Palma, *Rev.*

TEREBINTHACEÆ.

Pistacia Terebinthus L. Woods and rocky slopes; occasional; 4–5. I.! III. i. South slopes of San Roque, *D.*

P. Lentiscus L. Similar places; very common on Rock and in III. i. I.! III. i.! ii. Palmones Playazo! Occasional in mountains! iii. Guadacorte! Palmones Sands!

[*Schinus molle* L. is only planted.]

LEGUMINIFERÆ.

Anagyris fœtida L. Rough bushy hills; rather frequent; 12–3. I. Old Man's Garden! Above Willis's! Below Signal Station! Alameda Gardens! III. i. San Roque, *Wk.* Almoraima Station! ii. Hills north and west of Algeciras! Carnero Hills! iii. Near Los Barrios Station!

Retama monosperma Boiss. Sandy ground; rare; 12–2. [I. Planted.] III. i. Linea! Probably Dautez's S. Carbonera Station.

Spartium junceum L. Rough bushy places; local; 4–6. I. Engineer Road! Jews' Cemetery to Gymnasium! III. i. San Roque, *D.* ii. Very common at Algeciras, *D.* I have never seen it there.

Sarothamnus bæticus Webb. Woods and bushy places; locally frequent; 1–4. Leaves large, trifoliolate. I. *Lem.*! *Rambur*! Whole side of Rock below Michael's Cave covered with it, *K.* It is not so now. III. i. Slopes of San Roque, *Boiss. & Reut.*! Cork Woods! ii. Mountains! Carnero Hills!

S. Welwitschii B. & R. Woods; locally frequent; 4–6. Like *S. scoparius*, but pod densely hairy, leaves few or none. III. ii. Waterfall Valley!

S. grandiflorus Webb? Bushy places; rare or error? 4–6. Hardly distinguishable from last, and recorded by no other collector. I. *Rambur.*

Cytisus tribracteolatus Webb. Wooded slopes; locally frequent; 1–3. III. ii. Waterfall Valley and other valleys north of it!

C. candicans DC. Woods; type rare? 1–5. Fruit straight, rufescent-hirsute. I. *Wk.*, *K.* Upper Alameda, *Frere.*

Var. *Kunzeanus* P. L. differs in several minor characters, fruit curved, white-woolly, but apparently becomes rufescent in herbaria, so that the best distinction is lost. All I have seen has pod hairs quite white. It is very abundant. III. i. Cork Woods! ii. Mountains! Carnero Hills! Palmones Playazo! iii. Guadacorte! Palmones, *Laguna.*

C. linifolius Lamk. Bushy slopes and woods; locally common; 3–6. I.! III. i. Cork Woods! ii. Mountains! Carnero Point!

C. triflorus L'Hérit. Woods; locally frequent; 1–4. Flowers pendulous, rather pale greenish yellow, on long virgate branches. I. *Clus.*, *Tournef.* Not there now, I think. III. i. Cork Woods! ii. Mountains! Carnero Point!

Calycotome villosa Link. ("*Spartium villosum* L.," Kel.). Dry hills and bushy slopes; abundant; 12–5. I.! III.!

Genista scorpioides Spach. Rough bushy places; rare? 3–5. Very near next, but bracts at base of pedicels ovate, not subulate, spines stouter and longer. III. ii. S. de Palma, *Rev.*

G. triacanthos Brot. Similar places; locally frequent; 3–8. A rigid dark green bush, flowers usually in short subtruncate racemes. III. i. Queen of Spain's Chair! Cork Woods! ii. Palmones Pinar! Mountains!

Var. *galioides* Spach has stouter spines, longer leaves (3–4 lines), and denser racemes. III. ii. Hills above Algeciras, *Ball.* S. de Luna, *Laguna.*

†*G. Winkleri* Lge. Bushy hills; rare; 3–5. Like next, but leaves mostly trifoliolate, not simple, and bracts 3–4 times as long as, instead of little longer than pedicels. III. i. San Roque, *Winkl.*

G. gibraltarica DC. Similar places; locally common; 4–7. Flowers usually in long tapering racemes. [I. Included by Kelaart in error (see *K.* Fl. p. 93).] III. i. Queen of Spain's Chair! Cork Wood Crags! Between Almoraima and Long Stables! ii. Mountains!

†*G. Scorpius* DC.? Rocky hills and ravines; rare; 2–7. A stout-spined shrub with the aspect of a *Calycotome.* Pods much longer than last. Can Laguna have mistaken *C. villosa* for it? I. West slopes, *Laguna.*

†*G. Hænseleri* Boiss. Bushy hills; rare; 5. Very distinct, with a look of *Spartium junceum*, but flowers smaller. I. *K.* III. i. South slopes of San Roque, *D.*

Pterospartum lasianthum Wk. Heaths and rocky places on mountains; rare? 12–6. Differs little from next, chiefly in more woolly-tomentose, not silvery-silky calyx. Willkomm thinks they should perhaps be united. III. i. S. Carbonera, *D.* Almoraima, *P. L.* ii. Mountains, *Webb*, &c. S. de Luna, *Laguna.* S. de Saladillo, *P. L.*

P. tridentatum Wk. Similar places; locally common; 12–6. III. i. Queen of Spain's Chair! Cork Woods! Pine Wood Plains! Alcadeza Crags! ii. Mountains! M. de la Torre!

Ulex. §*Stauracanthus* has calyx as long as keel, lips shortly united at base, upper divided to middle. §*Nepa* has calyx about half as long as keel, lips similarly united, upper quite shortly bidentate. §*Eu-ulex* has calyx lips quite free, as long as keel. This section has the habit of *U. europæus.*

U. aphyllus Link. (§*Stauracanthus*). Woods and heaths; frequent; 2–4. III. i. Cork Woods! ii. Heath near Palmones Pinar! S. de Palma, *Clem.*

U. spartioides Wk. (§*Stauracanthus*). Similar places; rare? 3–4. I cannot distinguish this from last. III. i. Pine woods on south slopes of San Roque, *D.* There are no pine woods there now. ii. S. de Palma, *Clem.*, *Webb*, *Wk.*, &c.

U. Boivini Webb (§*Nepa*). Similar places; frequent or common; 5–11. Teeth of upper calyx lip deltoid. III. i. Queen of Spain's Chair! Almoraima, *Laguna*! ii. Frequent in mountains!

Var. *megalorites* Ball. Calyx teeth elongate, sometimes one-third as long as lip. III. i. Near San Roque, *Ball.* S. Carbonera, *D.* ii. S. de Palma, *Rev.*

†*U. luridus* Wk. (§*Nepa*). Very like last var., from which Webb's description hardly differentiates it. III. ii. Near Algeciras, *Porta & Rigo.*

U. scaber Kunze (§*Eu-ulex*). Bushy places; rare? 12–4. Spines slender, rather pliable, flowers rather small. Abundant elsewhere in the province. III. ii. Waterfall Valley!

†Var. *glabrescens* Webb has calyx hardly puberulous, with broader teeth. III. ii. S. de Palma, *Wk.*, *Rev.*

†*U. brachyacanthus* Boiss. (§*Eu-ulex*). I know nothing of this beyond Boissier's description. III. ii. Near Algeciras, *Porta & Rigo.*

U. australis Clem. (§*Eu-ulex*). (*U. parviflorus* Pourr.). Similar places; common; 2–4. III. i. Queen of Spain's Chair! Carteian Hills! ii. Mountains!

[*U. bæticus* Boiss. (§*Eu-ulex*). Kelaart says this covers many acres near Campamento. No *Ulex* is common there now, the very similar *U. australis* occurs sparingly.]

Adenocarpus grandiflorus Boiss. Wooded slopes; locally frequent; 4–6. III. i. S. Carbonera, *D.* Cork Woods! Alcadeza Crags! ii. Mountains!

[*Lupinus albus* L. is an occasional escape at Algeciras.]

L. hirsutus L. Sandy ground; occasional; 4–5. II. *K.*, *D.* III. i. By Campo Common! Below S. Carbonera, *D.* Almoraima! ii. Woods near El Cobre!

L. angustifolius L. Sandy ground; frequent, at least locally; 3–5. III. i. Spanish Racecourse, *Wk.* Cork Woods! ii. Palmones Pinar and Playazo! Behind Sandy Bay! M. de la Torre! iii. Palmones Sands!

L. luteus L. Similar places; rather frequent; 4–5. III. i. San Roque Station! Lajo Valley, below San Roque! Near Almoraima! Foot of S. Carbonera, *K.*, *D.* ii. Palmones Pinar! Cachon Farm! iii. Near Salt Pans!

Ononis campestris Koch & Ziz. Rough gravelly or clayey places; rare? 6–8. Stem hairy in lines, leaves narrow. I. *Talbot.*

†*O. repens* L. var. *horrida* Lge. Similar places; occasional; 6–8. Stem hairy all round, spiny. III. i. Carteian Hills! Near Francia's Farm! Path to First Pine Wood! Malaga Gardens! ii. Carnero Hills!

O. pinnata Brot. Sandy ground; locally frequent; 6–7. III. i. Cork Woods!? leaves only. ii. Palmones Playazo! (Probably Schott's "near Algeciras"). iii. Palmones Sands!

O. Picardi Boiss. Loose sand; locally abundant; 4–7. Annual, slender, diffuse, flowers rosy, tip of keel bright yellow. II. *D.* III. i. Pine Wood Plains! Alcadeza! Foot of S. Carbonera, *D.* ii. S. de Palma, *Rev.* iii. Palmones Sands! Guadacorte!

O. Cossoniana B. & R. Light sandy soil; occasional; 4–6. Much stouter and more erect than last, more leafy and with larger flowers, 5–6 lines long. I. Sentry Fence on North Front! II. III. i. Andalucian racecourse! ii. Behind Sandy Bay!

†Var. *rotundifolia* Wk. has larger rounder leaflets. I. *Rev.* A weed in Alameda Gardens! Dockyard! III. i. Near San Roque, *Rev.*

O. diffusa Ten. Dry sandy ground; occasional? 5–6. Differs from last in smaller size and foliaceous floral bracts, but not easily separable. I. Governor's Cottage (*K.*, as *O. serrata* Forsk., probably this but not synonymous, see Deb. Fl. p. 59). II. Sea sands on Neutral Ground near Catalan Bay, *Boiss.*, *K.*, *D.* III. i. Between Gibraltar and San Roque, *Salzm.* ii. About Algeciras, *Rev.*

O. mitissima L. Damp grassy banks and stream beds; frequent; 5–6. Annual, much branched, suberect, flowers very small, close set, rosy, bracts broad, white, with strong green nerves at base. I. East side, *K.* Signal Station Road! II. *K.* III. i. S. Carbonera, *D.* Ditches at Campamento! ii. By Railway! Carnero Hills!

O. filicaulis Salzm. Dry gravelly hills; frequent; 5–6. Much like *O. Picardi*, but grows in different soil, much less glandular and more greyish-hirsute, racemes more elongate in flower, standard brighter rose, wings and keel white, no yellow tip, and broader calyx segments, not with long subulate points. III. i. Bonel's Farm! Queen of Spain's Chair! Alcadeza Crags! ii. Carnero Hills!

O. Salzmanniana B. & R. Grassy places and ditches; rather frequent; 5–6. A stout suberect annual, spikes long, dense, thick, upper leaves trifoliolate, terminal leaflet very large, and bracts trifoliolate. III. i. By the Cachon! Railside beyond Almoraima! By Lajo below First Pine Wood! Road between Campamento and San Roque! By the Lobo! iii. By the Aguacorte!

O. alopecuroides L. Similar places; rare; 5–6. Resembles last, and perhaps a variety. Larger, leaves and bracts all unifoliolate, stipules larger and spike comose. III. i. About San Roque, *Brouss.*

O. Tournefortii Coss.? Sea sands; rare or error? 4–5. Near next, but much larger and stouter; leaves trifoliolate, corolla as long as calyx. A conspicuous plant, not recorded by other botanists. II. *D.*

O. variegata L. Sea sands; locally common; 4–5. A small annual, half-buried in sand, flowers bright yellow, twice as long as calyx, and unifoliolate leaves. I. By Sentry Fence! II.! III. i. Linea! ii. Sandy Bay! iii. Palmones Sands!

†Var. *erioclada* DC. I. Sands about Gibraltar, *Durand.*

O. reclinata L. var. *minor* Moris. Sandy and gravelly places; rare; 4–5. Flowers rose, soon pendulous, on long peduncles. The var. has shorter corolla and pods as long as calyx. The leaves in all I have collected are broadly oval or suborbicular. I. Signal Station! Princess Amelia's Battery! Above Mediterranean Tunnels! II. *K.*, *D.*

O. pendula Desf. Grassy or rocky places; occasional; 3–5. Habit of last, but flowers much larger, with yellowish, not rosy or whitish, wings. I. Buffadero Gate to Monkey's Cave! III. ii. Near Upper Aqueduct! Towards Saladillo! Carnero Hills! Sandy Bay!

O. pubescens L. Dry stony or sandy soil, especially dry watercourses; frequent; 4–6. Flowers large, yellow, peduncles muticous. I. Above Alameda Parade! Above Willis's! About Michael's Cave, *K. D.*, *Rev.*

O. viscosa L. Similar places; frequent; 4–6. Like last, but taller and much laxer, stems often red, peduncles longer and awned. I. Michael's Cave! Spur Battery! Levant! Above Engineer Road! III. i. and ii.!

Var. *fœtida* Deb. has narrower leaves, larger flowers and longer pods, about twice as long as calyx. III. i. Alcadeza Crags!? By Cagancha below San Roque!? Both these are perhaps as near type as var. ii. Algeciras, *Rev.*, *Winkl.*

†*O. crotalarioides* Coss. Similar places; rare; 5–6. Like last, but all leaves unifoliolate and pods much inflated, much longer than calyx. III. ii. Foot of S. de Palma at Algeciras, *Winkl.*

†Var. *rubricaulis* Wk. Elongate, with purple virgate branches and smaller leaves. III. ii. Near Algeciras, *Hegelm.*

†*O. breviflora* DC. Rocky grassy slopes; rare; 5–6. Like *O. viscosa*, and often regarded as a variety, but corolla shorter than calyx, and other differences. III. i. South slopes of San Roque, *D.*

O. ramosissima Desf. var. *gracilis* G. & G. (*O. gibraltarica* Boiss.). This species and the next vary indefinitely, and it is difficult to fix on any characters by which to separate them. I have regarded this as a dark green shrublet with very short glandular pubescence, and narrow elongate leaves. All other points seem unstable. The var. differs in its more slender virgate habit, with smaller leaves and peduncles with longer awns. I. Catalan Bay! Casual plants at Haynes's Cave and in Dockyard! III. i. Linea! Near Rocadillo! iii. Palmones Sands!

O. Natrix L. var. *media* Boiss. Dry hills and sandy ground; occasional; 4–8. As I understand it, a pale grey-green shrublet, with very long viscid pubescence and broadish leaflets, racemes more compact, the whole plant with the aspect of a large *O. pubescens.* It does not appear to be confined to sand dunes. The var. has smaller leaflets, often folded, and peduncles longer than floral leaves. These characters bring it very near *O. ramosissima.* I. *Boiss.*? ex Deb. Fl. p. 63. Boissier does not record it from the Rock in Voy. Bot. *K.*, *D.* III. i. Linea, *K.*, Fl. p. 178, not Neutral Ground, as cited by Debeaux.

†Var. *inæquifolia* Mut. Some, often very few, leaves pinnate, the alternate pairs of pinnæ small and close to the leaflets above them. III. i. Cork Wood Crags! Path to First Pine Wood! Malaga Gardens!

Medicago lupulina L. Rather damp grassy or shady places; rather frequent; 4–5. Spikes longly peduncled, of twelve or more very small flowers and small smooth fruits. II.! III. i. About Almoraima and Long Stables! By Lajo above Almendral! ii. Near railway about San Bernabe! iii. Gardens at Salt Pans!

[*M. sativa* L. as a cultivation escape has been found on the Rock and Neutral Ground.]

M. marina L. Sand dunes; rather frequent; 3–6. Densely white-tomentose. I. Beyond Catalan Bay! North Front! II! III. i. Near Pedrera! ii. Palmones Playazo! Sandy Bay! Towards Frayle Point! iii. Palmones Sands!

M. orbicularis All. Grassy places; occasional; 4–5. Fruit discoid, ¾ in. in diameter over thin spineless wing. I. Below Rock Gun! Grassy ravines, *K.*, *D.* III. i. About Long Stables and Almoraima! Near Malaga Gardens! Near mouth of Guadarranque, *K.*, *D.* ii. Algeciras, *Winkl.* iii. Hills near Los Barrios Station!

M. intertexta All. Grassy places; rather rare; 4–5. Large, hirsute, fruit very large, globose, closely embraced by long intertwining glabrous spines. III. ii. Near Algeciras, *Winkl.*, *Fritze.* Below railway near San Bernabe! iii. Hills near Los Barrios Station! Salt Pans near Palmones Village.

M. ciliaris Willd. Dry hills; rare; 4–5. Near last, but fruit grey-green from hispidity of spines, which are much shorter. III. i. At Carteia!

†*M. obscura* Retz. var. *tornata* f. *inermis* Urb. Waste sandy or grassy places; occasional; 3–6. Facial veins running into a lateral nerve, not a marginal one. I have only found the form cited which has an unarmed pod of four or more turns with thin edges, easily mistaken for unarmed forms of *M. littoralis.* I. Reclamation Road! Dockyard! Behind Assembly Rooms!

M. truncatula Gaertn. var. *longiaculeata* Urb. (*M. tribuloides* Desr.). Similar places; locally frequent; 3–6. Facial veins as last, but fruit subcylindrical, pubescent, spines stout from a very swollen base, not grooved nor hooked, usually parallel to axis and intercrossing. The var. cited is, according to Willkomm, the only one known in Spain. †*M. uncinata* Willd., found by Kelaart at Gibraltar, is a form with uncinate spines. I. From Buena Vista to Governor's Cottage! Reclamation Road!

M. rigidula Desr. (*M. Gerardi* Kit.). Similar places; rare; 3–6. Facial veins running into a marginal band instead of a lateral nerve, spines stout, though less so than in *M. truncatula*, and radial, not axial. It somewhat resembles *M. nigra*, but has stouter spines, neither grooved nor uncinate. I. Reclamation Road!

M. littoralis Rohde. Usually in deep sand; very common; 3–6. Veins as last, stems very long, straggling, fruit usually with few irregular radial spines, often curved and uncinate, varying much in length.

†Var. *inermis* Moris. Spines none or reduced to tubercles. Known from *M. tornata* by flat faces and thick edge of spirals. II.!

Var. *breviseta* DC. Spines equal to, or shorter than, diameter of spiral. A common form. I. Reclamation Road! II.!

Var. *longiseta* DC. Spines longer than diameter of spiral. The commonest form. I.! II.! III.!

†*M. turbinata* Willd. Waste sandy and grassy places; rare? 3–6. Very pubescent, pods rather large, tub-shaped, spines reduced to tubercles. *M. tuberculata* Willd. is very near this, but has aristate, not muticous, peduncles, and glabrous pods flat at base. III. i. At Carteia! By Lajo near upper ford!

Var. *aculeata* Gaertn. (*M. olivæformis* Guss.) has a spiny pod. I. Sandy fields near the Neutral Ground, *K.* III. ii. Algeciras, *Wk.*

M. Murex Willd. var. *sphærocarpa* Bertol. Similar places; rare? 3–6. Even nearer last than *M. tuberculata*, but pod glabrous, rounded at both ends. II. Sandy fields on Neutral Ground at foot of Fort San Felipe, *D.* III. ii. Algeciras, *Fritze, Rev.* Near San Bernabe, very glabrous, with short radiating spines!

M. hispida Gaertn. Similar places; common; 3-6. Spirals lax, hardly contiguous, spines radiating, grooved, and usually uncinate.

Var. *denticulata* Urb. (*M. denticulata* Willd.) has only 1–3 turns of spiral. III. iii. Near Los Barrios Station!

Var. *pentacycla* Urb. (*M. nigra* Willd.) has 5–6 turns and long spines. One of the largest and most conspicuous species. *M. Terebellum* Willd. differs only in its shorter spines, and *M. lappacea* DC., which may occur, in fewer (3–4) turns. I. *K.*, as *M. Terebellum.* Reclamation Road! Below Mediterranean Road! II. *K.*, *D.* III.!

M. coronata Desr. Similar places; rare? 3-6. Spirals as last, but fruit very small, of one or two turns, with short pectinate spines parallel to axis. I. *K.*

M. minima Lamk. Similar places; frequent or common; 3–6. Much smaller, fruit globose, with long fine spines radiating spherically. I.! III.!

Melilotus parviflora Desf. Fields and waste places; frequent; 3–6. Flowers usually very small, fruit globose, very coarsely reticulate. Large-flowered forms look very like *M. elegans.* I.! III. i. Slopes of San Roque, *D.* ii. Railside near Algeciras! Near Reina Cristina, quite prostrate!

†*M. alba* Desr. Rough slopes; rare; 4–5. III. ii. By the Lobo!

†*M. elegans* Salzm. Fields and waste places; frequent; 3–5. Fruit ellipsoid, transversely rugose. Seen in more stations than those noted. I. Sandpits! Reclamation Road! East slopes below Middle Hill! III. ii. Marsh near Palmones Pinar!

M. sulcata Desf. Similar places; very common; 3–5. Fruit with fine regular concentric ribs. I.! III. i. and ii.!

†Var. *angustifolia* Willd. with small flowers and narrow leaves, much resembling *M. parviflora*. I. Reclamation Road! Dockyard!

Var. *major* Camb., much larger and stouter, with broader leaves, and larger flowers. I. North Front, *Boiss.* II. A prostrate form! III. i. At foot of San Roque, *Boiss.* ii. Near Reina Cristina! El Saladillo!

†*M. infesta* Guss. Similar places; rare; 4–5. Fruit ribs fewer, wider, much less regular. I. *Winkl.*

†*M. messanensis* Desf. Wet grassy places and marsh borders; locally common; 3–5. Racemes short, axillary, very shortly peduncled, fruit very large. III. i. Punta Mala! III. ii. Marsh at Palmones Playazo! iii. Salt Pans!

†*Trifolium filiforme* L. Grassy places; rare; 4–6. Like next, but heads fewer flowered and laxer, pedicels longer than calyx tube, petiolule of terminal leaflet not or little longer than those of lateral. III. ii. By upper aqueduct!

T. minus Sm. Grassy places; occasional; 4–6. Flowers smaller than next, standard smooth, keeled, wings not diverging. More general than my records show. III. i. Bonel's Farm! Campamento Common! Alcadeza Ravine! iii. Guadarranque Marshes!

T. procumbens Sm. Dry bushy or stony places; very common; 4–6. Standard flat, strongly striate, spoon-shaped at tip, wings diverging. Very variable. Not synonymous with *T. agrarium* L. as Debeaux supposes. I.! II.! III.!

Var. *majus* Koch (*T. campestre* Schreb.). Erect, heads large and bright yellow, usually retaining their colour when dry. I. Moorish Wall!

Var. *minus* Koch (*T. procumbens* Schreb.). Often decumbent, flowers paler, drying whitish, peduncles shorter. Usually regarded as type. I. Signal Station! III. i. Wooded slopes of San Roque, *Boiss.*

T. repens L. Damp grassy places and by watercourses; rather common; 4–6. I. Roadsides and ditches, *K.*, *D.* III.! Reaches the mountains!

T. isthmocarpum Brot. Grassy places; locally frequent; 4–6. Flowers dull rather deep rose, pedicelled, bracteolate. II. *Munby*! III.! chiefly in ii.!

†*T. Jaminianum* Boiss. Similar places; rare; 4–6. Very near last, if not synonymous; a specimen at Kew from the original station at Algiers shows hardly any difference. Flowers white, calyx segments narrow, unequal, longer than tube, free part of stipules longer. III. ii. Algeciras, *Porta & Rigo.*

T. nigrescens Viv. Dry grassy places; locally abundant; 4–6. Like *T. repens*, but annual, not creeping, heads smaller, on axillary, not long pseudo-radical peduncles; corolla white, not pink as described. I.! II.! III. i. From North Front to Campamento!

T. glomeratum L. Rough banks and grassy places; rather rare; 4–6. Heads globose, sessile in nearly every axil. Known from *T. scabrum* by rose, not white flowers, bracteolate, not quite sessile, and pubescence not scabrous. III. i. West slopes Queen of Spain's Chair! Road to Bonel's Farm! Alcadeza Crags! ii. Valley north of Waterfall!

†*T. cernuum* Brot. Damp grassy places; very rare; 4–5. Heads small, lax, shortly peduncled, flowers white, soon deflexed, calyx teeth long, rather slender, spreading, longer than corolla, leaf-teeth setaceous, terminal seta long. III. iii. A single plant in Palmones Sands!

†*T. suffocatum* L. Dry grassy places; rare; 3–5. Heads very small, sub-basal in axils of long petioles. I. On *débris* of forts, *D.*, *Rev.* Path below Breakneck Battery!

T. strictum L. Grassy places; rare; 5-6. Erect, leaves narrow, bright glossy green, denticulations glandular, stipules very broad, corolla rose. III. i. Near ford to Pine Wood Plains! ii. Near Algeciras, *Rev.* Valley near Saladillo!

T. resupinatum L. Grassy places; very common; 3–6. Annual, heads small, corolla bright rose, inverted, calyx inflated and woolly in fruit, upper teeth much larger than lower, projecting from the wool. I. Europa Flats! II.! III.! Occasionally with white flowers!

T. tomentosum L. Similar places; equally common; 3–6. Like last, but corolla normal, fruit calyx quite hidden in wool. I. Below Victoria Battery! Near Michael's Cave! Rock Gun! North Front! II.!? III.!

T. fragiferum L. Similar places; less common; 5–7. Perennial, flowering much later, flowers much paler pink, heads larger, calyx less woolly, upper teeth about equal lower, slightly projecting. I. *K.* III. i. Railside beyond San Roque! By Lajo in many places! ii. Carnero and Algeciras Hills! Near El Cobre! iii. Palmones Sands! Guadacorte Marsh!

T. striatum L. Similar places; rare; 4-6. Standard and wings connate with stamens into a long tube. III. ii. Near Algeciras, *Rev.*

†*T. pratense* L.? Similar places; rare, or error; 5–6. I. *K.* III. i. San Roque, *D.* ii. Algeciras, *D.*

T. bæticum Boiss. Woods and bushy places; locally rather frequent; 4–6. Heads large, flowers white or pale cream, rarely pinkish. III. i. Almoraima! Path from San Roque to First Pine Wood! Alcadeza Crags! ii. Beyond El Cobre! Carnero Hills!

T. angustifolium L. Dry grassy places; common; 4–5. Heads very long, cylindrical, leaflets long and narrow. I.! III.!

T. stellatum L. Rough waste or grassy places; very common; 3–6. Heads subglobose, calyx segments stellately spreading in fruit. I.! III.!

T. lappaceum L. Dry grassy places; frequent or common; 4–5. Heads peduncled, calyx teeth little plumose, leaf sheaths long and strongly nerved. III.!

T. Cherleri L. Similar places; common; 4–5. Heads sessile, very plumose, with very broad involucrating stipules. III.!

T. albidum Retz. (*T. squarrosum* DC., *T. panormitanum* Presl.). Damp grassy places and roadsides; occasional; 4–5. Stout, rigid, with rather large heads of yellowish- or greenish-white flowers on axillary peduncles, calyx segments indurated in fruit, lower tooth very long and strongly deflexed, stipules very long. III. i. Roadside near San Roque! Near First Venta! Path to S. Lorca! ii. Path to El Cobre! Watercourses below El Saladillo! Carnero Hills! iii. Near Guadacorte!

T. leucanthum M. Bieb. Similar places; rare; 5-6. Allied to last, but much smaller, heads very longly peduncled, mostly terminal. III. ii. Near Algeciras, *Porta & Rigo.*

T. maritimum Huds. Damp grassy places, often remote from sea; common; 4–6. Glabrous, heads terminal, ovoid, flowers dull rosy, calyx closed at throat. II.! III.! especially in ii.!

†*T. Juliani* Batt. (*T. Xatardi* DC.?). Similar places; rare; 4–6. Probably only a variety of last with subequal calyx teeth. III. ii. Near Algeciras, *Porta & Rigo.*

T. ligusticum Balb. Shady places; rare; 4-6. Resembles *T. lappaceum*, but with cylindrical, not globose heads, occasionally twin, and shorter, broader, less strongly nerved leaf sheaths. III. ii. In one or two valleys in the mountains!

T. arvense L. Dry sandy fields and hills; rather frequent; 4-6. Usually erect, slender, pale green, with rather small ovoid white plumose peduncled heads. II. *D.* III. i. Campamento Common! Near Soto Gordo! Field beyond Almoraima! Lajo Valley! ii. Palmones Pinar! iii. Palmones Sands! About Guadacorte!

T. Bocconi Savi. Dry rough places; rare; 4–6. Heads small, few, sessile, axillary and terminal, often twin, with pale flowers, calyx open at throat, lowest tooth twice as long as others. III. i. Alcadeza Crags! ii. Near Algeciras, *Rev.*

T. scabrum L. Roadsides and dry places; abundant; 3–6; Usually prostrate, with sessile axillary heads of small white flowers, calyx closed, much indurated and nerved in fruit, with rigid divaricate teeth. I.! II.! III.!

†*T. subterraneum* L. Grassy places; common; 2–6. I. Europa Flats! II.! III.!

†*Anthyllis Vulneraria* L. Dry banks and grassy places; locally frequent; 3–5. The type with pale yellow corolla and concolorous calyx is rare. II. *D.*

Var. *rubriflora* DC. Calyx wholly or partly purple, corolla yellow or red. I have only seen it yellow. I. Mediterranean Steps and slopes below! III. i. Everywhere on slopes of San Roque and Fort San Felipe, *K.*, *D.* ii. S. de Palma, *K.*, *D.* Carnero Point, and scattered to hill tops!

A. cytisoides L. Dry bushy slopes; locally frequent; 4–6; Shrub, 4–6 ft. high, like a *Cytisus*, flowers in rather long dense racemes. III. i. Cork Wood Crags!

Physanthyllis tetraphylla Boiss. Rough slopes and grassy, sandy places; common; 3–5. I. Chiefly south! III. Reaching high up mountains!

Cornicina Lœflingii Boiss. Uncultivated fields; rare; 5–6. Differs from next in much longer peduncles, lateral leaflets few, smaller than terminal, pod annulate. III. ii. Algeciras, *Née*, *Webb.*

C. hamosa Boiss. In deep sand; locally common; 4–5. I. Catalan Bay! III. i. Pine Wood Plains near Lajo! Cork Wood Crags! ii. Palmones Playazo! iii. Palmones Sands!

Dorycnopsis Gerardi Boiss. Bushy and heathy places; rather rare; 5–6. III. i. Queen of Spain's Chair! By Lajo at Pine Wood Plains! Alcadeza Ravine! ii. By Miel below El Cobre! iii. Palmones Village, *Rev.*

Bonjeania recta Reichb. Marshy places and by rivers; frequent; 5–6. III.! Very abundant in marsh beyond Almoraima!

B. hirsuta Reichb. Dry bushy slopes; rather rare; 4–6. III. i. Magazine Hill! Long Stables Ravine! Path to First Pine Wood! Near Alcadeza!

Tetragonolobus purpureus Moench. Open slopes and grassy fields, especially cultivated; frequent; 3–4. I. Chiefly north-west slopes! Windmill Hill, *K.* Near Inundation, *K.* III. i. and ii.!

†*T. pseudo-purpureus* Uechtr. Similar places; rare; 3–4. Differs in shorter pod with shorter and broader wings. Porta & Rigo's specimen at Kew looks like a mere variety of last. My 519 from Middle Hill may be this. III. i. Field borders near San Roque, *Porta & Rigo.* ii. Meadows near Algeciras, *Fritze*, *Winkl.*

†*T. conjugatus* Ser. Similar places; rare; 3–4. Flowers smaller and paler, pod much more slender, not winged. III. ii. Meadows near Algeciras, *Fritze*, *Winkl.*

†*T. siliquosus* Roth. Similar places; rare; 5–6. Perennial, with large solitary yellow flowers on long peduncles, pod narrowly winged. I. *Lag.*

†*Lotus edulis* L. Dry sandy or grassy slopes; common; 3–5. Flowers 1–2, pod much inflated. I.! III. i. and ii.! Reaches Carnero Point!

L. ornithopodioides L. Similar places; common; 3-5. Flowers several, smaller, with long pendulous pods. I.! III.!

L. cytisoides L. Dry rocky and bushy places; locally abundant; 3–5. Like *L. corniculatus*, but in larger laxer patches, often subscandent, wings connate in front. A form with pale or whitish yellow flowers occurs. I.! III. i. Ruins of Carteia! Slopes of San Roque, *D.*

L. creticus L. Sand dunes; rather frequent; 2–7. Large, prostrate, leaves silvery-silky, flowers large. *L. Salzmanni* B. & R. and *L. commutatus* Guss. are varieties differing chiefly in form and relative lengths of calyx teeth. I. A plant or two at Lighthouse! Catalan Bay! North Front Sentry Fence. II.! III. ii. Palmones Playazo! Sandy Bay! iii. Palmones Sands!

L. corniculatus L. Dry grassy places; rare? 3–5. Perennial, differing also from *L. arenarius*, which often closely resembles it by its entire styles. I. Signal Station Road! A very large form like *L. uliginosus*, which the Rev. E. S. Marshall thinks near var. *crassifolius* Pers. This may be the form mentioned by Kelaart in Fl. p. 98, as near *L. major* Scop. III. i. Beyond Alcadeza Crags! Cork Woods!

Var. *hirsutus* Koch is a more hairy variety. I. Dry grassy slopes in south and west, *K.*, *D.*

†*L. uliginosus* Schk. Damp bushy places; rare; 4–6. Much taller and stouter, tips of calyx teeth divergent in bud. III. ii. By streamlet above El Cobre!

L. arenarius Brot. Dry sandy places, often in deep sand; locally common; 3–7. Annual, with flowers inclining to orange, styles bifid. I. *K.*! II. Very abundant! III. i. Towards Pedrera!

Var. *major* Wk. By description this differs chiefly in size, but *L. canescens* Kunze, cited as synonymous, is densely covered with yellowish tomentum and looks very different. I. Jews' Cemetery!? A glabrous plant as stout as *L. uliginosus*, with the bifid style of *L. arenarius*, and differing from both in its long narrow calyx tube, with teeth much longer than tube.

L. angustissimus L. Sandy ground; rare? 4–6. Differs from next in several unstable characters, the most constant being its long slender fruit, 3½–5 times as long as calyx. Young examples placed to *L. hispidus* may belong here. II. Damp sand, *Boiss.*, *D.* III. ii. Algeciras, *ib.*

L. hispidus Desf. Sandy places, and in woods; common, at least locally; 3–6. Fruit not more than 2½ times calyx or less, thicker than in last. The corolla often turns green after drying, but this may not occur for months. III. i. Pindalista! ii. Near Cortijo Trinidad! M. de la Torre! Mountains! iii. Guadacorte and Guadarranque Marshes!

L. parviflorus Desf. Dry or wet places on heaths and open mountain slopes; locally common; 3–6. Petals and fruit scarcely longer than calyx. The corolla ultimately often turns green, as in last, but this is not a constant character. I. Behind the Mount, *K.* Probably the reference on p. 60 to *L. angustifolius* refers to this. III. i. Bonel's Farm! Alcadeza! Pine Woods near San Roque, *Wk.* ii. Mountains!

Psoralea bituminosa L. Rough or bushy places; common on Rock, much less so in Spain. It varies much in size. I.! III. i. Alcadeza! ii. Algeciras! In the mountains! M. de la Torre! Carnero Hills!

Var. *latifolia* Moris (*P. plumosa* Rchb., *P. palæstina* Mor.) is a large form, which Perez Lara does not distinguish even as a variety. I.! III. ii. Algeciras, *Rev.*

Galega officinalis L. Bushy places by streams; rather common; 4–5. III. i. Lajo Valley below Almendral! A large mass in field beyond Almoraima, and elsewhere! ii. and iii.!

Astragalus epiglottis L. Dry sandy places; rare; 3–5. Annual, with bicuspidate, centrifixed hairs, flowers very small, whitish or pale yellowish, turning blue, in dense axillary, very shortly peduncled heads. I. *Lag.*, *Winkl.* III. iii. Palmones, *Rev.*

A. pentaglottis L. Dry gravelly places; occasional, or locally frequent; 4–5. Flowers pinkish purple, in dense round heads, on very long peduncles. III. i. Opposite Francia's Farm! Carteian Hills! Between San Roque and First Pine Wood! North of San

Roque! ii. Railside and adjacent fields near Algeciras! Carnero Hills!

†*A. algarbiensis* Coss. Sand dunes; very local; 4–5. Annual, with yellow flowers in very short racemes on very long axillary peduncles, racemes elongating in fruit, fruit obliquely ovoid, apiculate, glabrous. III. iii. Sandy hillock west of Guadacorte Marsh!

A. hamosus L. Dry gravelly places; rather frequent; 3–5. Like next, but smaller and more diffuse, with falcate pods. I.! II. *D.* III. i. Slopes of Fort San Felipe, *D.* River bed above Almoraima! ii. Algeciras, *Rev.* iii. Near Salt Pans!

A. bœticus L. Similar places; equally frequent; 4–5. I. Rock and North Front! II.! III. i. About San Roque! ii. Algeciras, *Rev.* Carnero Hills!

[*A. depressus* L., communicated to Kelaart by Lemann, was probably an error, though he is usually accurate. It is not known in the province, nor is it North African.]

A. lusitanicus Lamk. (*Phaca bœtica* L.). Woods and shady places; rather rare; 2–4. A large coarse species, with racemes of large white flowers, and much inflated pods. [I. Cultivated? *K.*] III. i. Spanish racecourse, *D.*; not there now. Sandy fields at San Roque, *D.*, *K.* Cork Woods!

Biserrula pelecinus L. Cultivated and fallow fields; rare; 3–6. Pods long, pendulous, scalloped. III. i. Near San Roque, *Brouss.*

Scorpiurus sulcata L. Cultivated and rough fields; abundant as an aggregate; 3–6. The type has spiny pods, the convolutions all in one plane. The floral characters are quite unreliable. I only cite stations where I have collected the varieties. I. Dockyard! Europa Glacis!

Var. *subvillosa* P. L. Pod very similar, but convolutions very irregular and not in one plane. As abundant as type. I. Levant! Sandpits! III. i. Beyond Bonel's Farm! ii. Railside near Algeciras!

Var. *muricata* P. L. Spines very short, or reduced to tubercles. Decidedly rarer. III. i. Campamento Common! Near S. Lorca!

S. vermiculata L. Similar places; abundant in Spain; rare on Rock; 3–6. Spines cylindrical and densely contiguous, covering the whole pod. I. Rare, *K.* II.! III.!

Coronilla glauca L. Bushy places and ravines; frequent on Rock; 1–3; rare in Spain; 3–5. I. Chiefly about Mediterranean Steps, and above Lower Lines, scattered elsewhere! III. i. Ravine near Long Stables!

C. juncea L. Similar places; locally common; 3–5. III. i. Cork Wood Crags!

[*Hippocrepis comosa* L. is recorded from San Roque by Kelaart only.]

†*H. unisiliquosa* L. Grassy places; rare; 3–5. III. i. Orchard by Arroyo Viejo, below Malaga Gardens!

H. multisiliquosa L. Dry places and cultivated soil; rather common; 3–5. I.! III. i. and iii.!

Ornithopus repandus Poir. Dry gravelly or sandy places; local or rather rare; 3–5. Annual, lower leaves simple, rest pinnate, with the lower pair of pinnæ large and stipuliform, true stipules minute. III. i. Cork Wood Crags! Near Second Pine Wood! Almoraima! Bonel's Farm!

O. scorpioides L. Similar places and in cornfields; locally common; 3–5. Closely resembling last, but leaves trifoliolate, lowest pair stipuliform, the terminal very large. III. i. About Pinar de los Bigotes!

O. ebracteatus Brot. Sandy fields; frequent; easily overlooked; 3–5. III.!

O. compressus L. Similar places; very common; 3–5. I. At foot of Rock, *Lem.* II.! III.!

O. roseus L. (*O. sativus* Brot.). Sandy places; very common; 3–5. Pods straight, with contiguous joints, beak curved, by description as long as last joint, but I find it usually twice as long. III.!

Var. *macrorhynchus* P. L., has beak 3–4 times as long as last joint. III. i. Almoraima, *Porta & Rigo.*

Var. *isthmocarpus* P. L. Pod much curved, joints separated by a distinct isthmus, beak 3–4 times last joint. I. Uncultivated sands at Gibraltar, *Brouss.* III. ii. Algeciras, *Rev.*

Hedysarum capitatum Desf. Dry gravelly hills; occasional or locally common; 4–5. Annual, with deep rose, not crimson flowers. III. i. Opposite Francia's Farm! Carteian Hills! Alcadeza Plain!

H. coronarium L. Fields and hills; abundant in Spain; 4–6. I. Very rare, *K.* III.! Certainly not abundant in Cork Woods, as Debeaux reports; I have not seen it there.

H. humile L., var. *majus* Lge. (*H. Fontanesii* Boiss.). Bushy places; rare; 3–5. Leaves much narrower, stipules connate. III. i. Near San Roque, *Boiss.*

Onobrychis eriophora Desv. Sandy ground; rare; 4–6. Resembles *Hedysarum coronarium* but smaller, with much smaller narrower leaflets, and pod of one woolly joint. III. ii. S. de Palma, *B. & R.* ii. or iii. Sands by Palmones River, *B. & R.*

Vicia sativa L. Bushy places; frequent; 3–5. A protean species, not always easily separable from *V. angustifolia.* I.! II.! III.!

Var. *macrocarpa* Moris. Flowers 1 in., pods 2–2½ in. by 3–5 lines, prominently reticulate. Perez Lara says this is the most frequent form, and it is the only one admitted by Debeaux, but I have not identified it. III. Between the Neutral Ground and Algeciras, *K.*, *D.* i. Slopes of San Roque, *ib.*

Var. *cordata* P. L. Lower leaves obcordate, upper bilobed, flowers 6–7 lines, pods 1¼–2 in. by 2–3 lines, reticulate, but not prominently. I think common. I. Near Willis's! Mediterranean Steps! III. ii. S. de Palma, *Rev.* My 2012 from near El Saladillo has very peculiar leaflets 1 in. by ½ in., with a long cuspidate apex, not retuse. It resembles nothing I know.

V. angustifolia Roth. Similar places; frequent, but less so than last; 3–5. Smaller in all its parts, with narrow more cylindrical pods. III.!

Var. *segetalis* Thuill. Usually regarded as the type, has obcordate or oblong-lanceolate leaflets. III. i. Queen of Spain's Chair! ii. Palmones Pinar!

Var. *Bobartii* Forst. Upper leaves or all with narrow linear leaflets. Perez Lara takes this as the type. III. ii. Waterfall! My 1998 is a very narrow-leafleted form!

V. hybrida L. Cultivated or waste places and roadsides; occasional or rare; 3–5. Closely resembles *V. lutea*, but standard villous on back, and leaflets usually truncate or retuse. I. *Wk.* Foot of Mediterranean Steps! III. i. Foot of San Roque, *D.*

V. lutea L. Similar places; occasional; 3–5. Flowers very pale yellowish, rarely slightly washed with violet, standard glabrous, leaflets acute or acuminate, not retuse. Only the var. is recorded by Debeaux. I. Above Willis's! Sandpits! III. i. Near Linea Cemetery! About Almoraima!

Var. *hirta* Boiss. Much more pilose, with longer denser hairs on pods. III. i. or ii. Cultivated and sandy fields by Guadarranque, *D.*

V. vestita Boiss. Mostly in cultivated fields and railway banks; frequent, 3–5. Flowers not yellow as described, but rather dark purple, wings and back of standard dull yellowish. III.!

†Var. *tuberculata* Wk. Pod with large scattered tubercles bearing long white hairs. This only is recorded by Debeaux, though the type is more common. III. i. Marshy places in sand desert, *D.* ii. Algeciras, *Winkl.* My 662 from railside may be this.

†*V. onobrychioides* L. Wooded slopes; rare; 5–6. A climbing perennial, with long peduncles bearing 6–12 large violet flowers, with paler keels, calyx tube straight, pod long, 5–10-seeded. III. ii. Near Algeciras, *Winkl.*

†*V. cassubica* L. Similar places; rare; 6–7. Like last but erect, with more numerous flowers on peduncles shorter than leaves, pod short, rhomboid, 2-3-seeded. III. i. About San Roque, *Brouss.*, *Lag.*, *Durand.*

†*V. tenuifolia* Roth. Shady ravines; rare; 5–6. Perennial, calyx tube obliquely truncate or rounded at base, not saccate. Very like *V. Cracca* but stouter, peduncles longer than racemes, the whole longer than leaf, flowers pale blue, limb of standard longer than claw. III. i. South slopes of San Roque, *D.*

V. Cracca L. Woods and bushy places; locally frequent; 4–7. Flowers shorter, violet blue, standard shorter, limb as long as claw, peduncles shorter than or equalling raceme, the whole rarely longer and often shorter than leaf. III. i. Near Almoraima! Long Stables Ravine! ii. M. de la Torre! Mountain Valleys! A white flowered form occurs!

V. varia Host. Wooded and bushy places; rare; 4–6. Near last, but annual or biennial, calyx saccate at base, corolla larger, violet, with wings paler or whitish, standard shorter than claw. III. i. Almoraima, *P. L.* About San Roque, *Boiss.*!

V. villosa Roth. Similar places; rare; 5–7. Very near last, but flowers opening in succession from bottom, not all simultaneously, raceme plumose in bud, lower calyx teeth longer and narrower, and corolla wholly blue. III. i. Lajo bed above upper ford! Alcadeza Crags! Above Almoraima Station!? ii. S. de Palma above Algeciras, *Fritze*.

V. pseudo-cracca Bertol. var. *multiflora* P. L. Similar places; rare; 5–6. Near last. The type has only 3–6 flowers, blue with yellow wings, but the var. with 8–20 blue flowers seems indistinguishable from *V. villosa*. III. ii. Garganta del Capitan, *P. L.*

V. atropurpurea Desf. Dry fields and bushy places; occasional; 4–5. I. *K.* II. A single plant! III. i. Bonel's Farm! Pine Wood Plains! Almoraima! Carteia, *K.* ii. Palmones Pinar, &c.! iii. Guadacorte!

†*V. bœtica* Lge. Rough bushy places; locally common; 5–6. A straggling climber, with pale blue and white flowers. III. ii. Wooded hills above Algeciras, *Fritze*, *Winkl.* Near Carnero Point and in Frayle Valley!

†*V. disperma* DC. Sandy fields; rare; 4–5. Peduncles aristate, flowers small, style laterally compressed, bearded under apex only, pod obliquely truncate and beaked at apex. III. ii. Near Algeciras, *Rev.*

V. gracilis Lois. Damp grassy places; frequent; 4–5. I. Bushy places, *K.* III.! Abundantly in Guadacorte Marshes!

V. pubescens Boiss. Bushy places; usually in woods; locally abundant; 4–5. Peduncles muticous, pod 4–6-seeded. III. i. East slopes Chair! Long Stables! ii. M. de la Torre! Mountains!

[*V. Ervilia* Willd. is cultivated about San Roque and Algeciras.]

Lathyrus Clymenum L. Bushy places and cornfields; rather frequent; 3–5. There are two colour forms; one has a dark purple standard with paler bluish wings, the other a dull cherry red standard with lavender wings, or more rarely a bluish pink standard and white wings (*L. articulatus* L.?). The former is the prevailing form on the Rock and in uncultivated soil, the pale one usually in cornfields.

Var. *latifolius* Godr. with oblong lanceolate leaflets, and var. *tenuifolius* Godr. with linear lanceolate ones grow together, the former the commoner on the Rock. I! III. i. and ii.! The dark form is rarer, that with white wings only on railway near Algeciras!

L. Ochrus L. A weed of cultivation and by roadsides; frequent; 3–5. I. *D.* III. i. and ii.!

L. Aphaca L. Waste and cultivated places, bushy hills and woods; rather frequent; 3–6. I. Gardens, even in the Town, *D.* III. i. About Almoraima and Long Stables, &c.! ii. and iii.!

L. annuus L. Sandy and gravelly hedgebanks and grassy places; occasional; 4–6. III. i. Campamento Common! Almoraima! Between Neutral Ground and Guadarranque, *D.* ii. Seen but no stations noted! iii. About Salt Pans!

L. Cicera L. Cultivated fields and bushy places; rare? 3–5. Flowers crimson or scarlet, peduncles muticous, pods large oblong. Differs from *L. setifolius* in size, and in style twisted so as to appear flattened laterally at apex. III. i. Slopes of San Roque and Queen of Spain's Chair, *D.* iii. Railside at Guadacorte!

*†*L. sativus* L. Cultivated fields, also in woods; occasional; 3–6. Flowers turquoise blue and white. III. i. and ii.! Sometimes a field full. Cork Woods about Almoraima, rare!

*Var. *stipulaceus* Wk. (*L. quadrimarginatus* Bory & Chaub. var. *amphicarpos* Wk.). Flowers blood red, pods winged back and front. III. Near Gibraltar, *Lag.*

L. hirsutus L. Damp grassy or marshy spots; occasional; 4–6. Flowers dark violet, pods very hispid or villous. III. i. Beyond Almoraima Station! ii. Railside near San Bernabe, with broad leaflets! Near El Saladillo, with narrow leaflets! iii. Guadacorte Marshes! Salt Pans!

L. tingitanus L. Bushy places; rare; 4–6. Flowers large, deep crimson, keel with a long narrow beak. I. *K.*, *D.* III. i. Between Linea and S. Carbonera, *Porta & Rigo*! ii. Algeciras, *Rev.* By Arroyo Gaba! Railside towards M. de la Torre!

[*L. odoratus* L. has been found as an escape at Algeciras by Reverchon.]

L. latifolius L. Bushy places and woods; frequent; 5–6. Varies considerably in width of leaflets, but I have not seen good var. *angustifolius*. III. i. Cork Woods! Arroyo Viejo! Alcadeza! ii. Carnero Hills! iii. Guadacorte Marshes!

L. angulatus L. Grassy places; rare? 3–5. A small annual with purple or violet, not scarlet flowers, peduncles awned, much longer than petioles, pods linear, seeds angular, tuberculate. I. *Finlay*! III. i. Andalucian Racecourse! Bonel's Farm! ii. Algeciras, *Winkl.*, *Rev.* Almoraima, *Porta & Rigo*!

L. sphæricus Retz. Similar places; rare; 3–5. Very similar to last, but usually larger, flowers scarlet, peduncles as long as or longer than petioles, seeds globose, smooth. III. i. About Almoraima and Long Stables!

L. setifolius L. Rough bushy places; rare? 4–5. Flowers scarlet or brick red, peduncles muticous, pods rhomboid. Known from *L. Cicera* by its smaller size, and style not twisted. I. *Lem*! Above Willis's! Above Engineer Road!? III. ii. About Waterfall!? No specimens kept from stations queried.

[*Pisum arvense* L. is an occasional weed in cultivated fields. Seen also at Sandpits.]

[*Erythrina Corallodendron* Willd., *Dolichos lignosus* L., *D. purpureus* L., *Acacia Farnesiana* Willd., *Gleditsia triacanthos* L., *Cercis siliquastrum* L., and *Ceratonia Siliqua* L. are all cultivated species, but the last-mentioned occurs subspontaneously about San Roque.]

ROSACEÆ.

Rubus ulmifolius Schott (*R. discolor* W. & N.). Bushy places; common, often very abundant; 4–10. I can only distinguish one fairly constant species, which the Rev. W. Moyle Rogers thinks best under this name. I. Engineer Road! Lower Lines! III.!

Var. *amœnus* P. L. is regarded as the usual form, common throughout Andalucia, but no specimens I have examined agree with Debeaux's description in Fl. p. 78. III. ii. Algeciras, *Rev.*

Rosa sempervirens L. Bushy places; especially by watercourses; frequent; 5–7. III.! Especially common in Cork Woods!

R. micrantha Sm. Bushy places; rather rare; 4–6. The segregate was named *R. septicola* Déségl. for me by Prof. Dingler. III. i. By Lajo near Second Pine Wood! About Almoraima! ii. By Miel from near source to below El Cobre!

[*R. canina* L. recorded by Kelaart is not a native of Gibraltar.]

[*Amygdalus communis* L. occurs subspontaneously, more frequently beyond our limits. A tree or two grows some way above Ince's!]

†*Spiræa flabellata* Guss. Bushy hills; rare; 5–6. III. i. S. Carbonera, *Rev.*

[*Fragaria vesca* L. recorded by Kelaart as cultivated in Gibraltar gardens.]

†*Potentilla Tormentilla* Sibth. Bushy places in mountains; locally frequent; 3–6. Only var. *elatior* Lehm. is given by Debeaux. It is taller, leaves with broader segments, and stipules tridentate, but I have seen nothing different from the usual British form. III. ii.!

P. reptans L. Damp grassy hollows and stream beds; frequent; 4–7. III.! Frequently not flowering.

Agrimonia Eupatoria L. Damp bushy spots and by streams; frequent; 4–7. III.!

†*Alchemilla arvensis* Scop. In short grass in rather dry places; frequent; 3–5. I have only seen small forms resembling *A. microcarpa* B. & R. in short calyx limb, but the fruit is ovoid, not subglobose. III. i. First Pine Wood! Cork Woods! ii. Mountains to Guadalmeci!

Poterium verrucosum Ehrenb. (*P. mauritanicum* Boiss.). Dry roadsides and fields; frequent; 4–5. Glabrous or densely pilose below, fruit obsoletely tetragonous, densely and coarsely tuberculate. I. About Willis's, &c.! Engineer Road! II.! III.!

Var. *Magnolii* P. L. Fruit more angular, ribs more visible, but it hardly differs, and all I have gathered fit type best. III. i. South slopes Queen of Spain's Chair and San Roque, *D.* ii. S. de Palma, *D.*

P. multicaule B. & R. Bushy or heathy places on hills; locally frequent; 3–5. Much smaller, usually stemless. III. i. From Queen of Spain's Chair to Cork Wood Crags!

Cratægus monogyna Jacq. Bushy places and woods; frequent; 3–5. I.! III.! Abundant in parts of Cork Woods and at foot of Algeciras mountains, more rarely near summits!

[*C. maura* L. f. is now regarded as synonymous with last. It is at most a form with narrow cuneate leaves, trilobed at apex only. Good forms seem quite rare, but not confined to Rock.]

C. brevispina Kunze. Similar places; rare? 3–5. Differs from *C. monogyna* in little but purple-veined petals, and blood red, not bright red fruit, and I suspect it is merely a form of that species. III. i. San Roque, *Wk.* ii. Algeciras, *Wk.* Mr. Druce tells me he has seen it at the latter station.

Pyrus communis L. var. *Mariana* Wk. Bushy hill slopes; occasional; 2–3. Only this variety is recorded. It differs in spinescent branchlets, ovate or oval-subrotund leaves, and turbinate globose fruit on very thick peduncles. I have not seen any named specimens; my own agree very closely with *P. cordata* Desf. in their small neat leaves, but that species is not recorded for Spain. [I. The type cultivated, *K.*] III. i. East slopes Chair, very small bushes almost buried in heather! Alcadeza Crags to Majarambout! ii. S. de Luna about Algeciras, *P. L.* iii. Sandy ground near Guadacorte Marsh!

**Cydonia vulgaris* Pers. is quite naturalized here and there, as beyond Almoraima and Long Stables, remote from buildings, also in Palmones Sands, small barren bushes looking quite native.

[*Prunus Armeniaca* L. and *Eriobotrya japonica* Lindl. are only cultivated.]

[GRANATACEÆ.]

[*Punica granatum* L., as the remains of cultivation, looks native in several places on the Rock and in Spain.]

MYRTACEÆ.

Myrtus communis L. Bushy places and woods; frequent or common; 6–7. III. i. Foot of Chair! Alcadeza Crags! Cork Woods! ii. Palmones Playazo! iii. Palmones Sands!

LYTHRARIEÆ.

†*Lythrum Salicaria* L. Marshes and by rivers; type rare, var. rather frequent; 6–9. III. i. Behind Almendral, *K.*

Var. *tomentosum* DC. More canescent, spikes dense, villous tomentose. III. i. By Lajo in many places! Cork Wood Sotos! ii. Palmones Playazo! Carnero Hills! iii. Guadacorte Marshes, sometimes 6–8 ft. high!

L. Græfferi Ten. (*L. flexuosum* Lag.). Damp grassy places, roadsides, and ditches; very common; 4–8. II.! III.!

Var. *Preslii* Deb. Stem erect, simple, lower leaves rounded or subcordate at base, upper narrow. II. and III., *K.*, *D.*

L. Hyssopifolia L. In drier places; common; 4–6. Annual, flowers smaller, petals paler, 5–6, also stamens. II.! III. i. and ii.! My 1196, from sands near Pedrera, is small, subsimple, 2–3 in. high, and looks different.

L. thymifolia L. Dry light soil; rare; 5–6. Smaller and more slender, petals very small, 4, stamens 2. III. i. Near San Roque, *Ball*! ii. Railway near Algeciras! iii. Roadside near Los Barrios Station!

†*Peplis Portula* L. Marshes and ditches; rare? 5-6. Only the variety is recorded, but my only gathering is type. III. ii. Hills near San Bernabe!

†Var. *longedentata* J. Gay differs in its sessile flowers,

bracteoles longer than calyx tube, stipules large, often connate with base of tube, outer calyx teeth twice inner and gland-tipped. III. ii. S. de Palma, *Rev.*

†*P. erecta* Req. Damp sandy places; rare; 4–6. Erect, 1–2 in. high. III. iii. Palmones Sands!

HALORAGEÆ.

†*Myriophyllum alterniflorum* DC. Pools; rare; 4–5. III. ii. Near Palmones Pinar!

ONAGRARIEÆ.

**Œnothera stricta* Ledeb. Deep sand; rather frequent; 4–6. I. *D.* II. *D.* III. i. Linea Sands! Punta Mala! Puente Mayorga! Near Rocadillo! iii. Guadacorte! Salt Pans!

Epilobium hirsutum L. var. *villosissimum* Koch. Marshes or by pools; locally frequent; 6–9. III. i. Cork Wood Sotos! iii. Guadacorte Marshes! Salt Pans!

†*E. Tournefortii* Michal. (*E. virgatum* Fr. var. *majus* Lge.). Hedges and ditches; occasional; 5–8. Allied to *E. obscurum* Schreb., but much taller, stouter, darker green, with the look of a glabrous *E. parviflorum.* III. i. By the Lajo! Railside near San Roque Station! ii. Roadside near Algeciras! El Cobre! iii. Guadacorte Marsh!

E. adnatum Griseb. (*E. tetragonum* L.)? Similar places; rare or error? 6–9. I suspect the last species has been mistaken for this. III. i. or iii. Marshes on banks of Guadarranque, *D.* Ditches at San Roque, *Pourr.*

E. parviflorum Schreb. Similar places; rare; 6–9. III. ii. At El Cobre, a very white villous form!

†*Isnardia palustris* L. Springs and running water; rare; 7–8. III. ii. S. de Palma, *Rev.*

TAMARISCINEÆ.

Tamarix gallica L. River banks and wet places; rare? 4–5. Very like next, but racemes 1½–2 in. long, lax and slender, hypogynous disc with ten obtuse angles, filaments salient from them, anthers longly apiculate. [I. Cultivated, *K.*] II. At foot of Fort San Felipe, *D.*

T. africana Poir. Similar places; frequent; 3–4. Racemes shorter and denser, disc with 5 acute angles, filaments not salient, anthers muticous. [I. By North Front Cemetery, planted!] III. By rivers and at Salt Pans!

CUCURBITACEÆ.

Bryonia dioica Jacq. Bushy places, hedges, and woods; occasional; 3–5. I. *K.* III. i. Near Fort San Felipe, *K.*, *D.* About San Roque and by river below Station! Cork Woods! ii. Arroyo Gabo, and elsewhere! Carnero Hills!

Ecballium Elaterium Rich. Dry rocky *débris*; locally common; 1–12. I. From Mediterranean Steps to Buena Vista! Near Michael's Cave!

PORTULACACEÆ.

Portulaca oleracea L. A weed in sandy gardens; locally frequent; 2–9. Hardly looks native, but Perez Lara does not question its status. III. i. Linea! ii. Algeciras Station! Near First Venta! iii. Salt Pans!

PARONYCHIACEÆ.

Corrigiola telephifolia Pourr. var. *foliosa* P. L. Dry grassy and stony fields; very common; 1–12. Between type and *C. littoralis*. I. *K.* III.!

†*Herniaria incana* L. Dry sandy soil; rare; 5–6. A whitish pubescent perennial, with very shortly pedicellate flowers, few in clusters or in short axillary racemes, sepals densely pubescent, edges and apex not ciliate. Easily confounded with *H. cinerea* DC., a frequent Cadiz species, but annual, clusters larger, flowers quite sessile, sepals with longer more rigid hairs and ciliate at apex. II. *K.*, *D.* III. i. Railway beyond San Roque!? Perhaps *H. cinerea*.

†*Illecebrum verticillatum* L. Damp sandy places; rare; 2–7. III. i. Pools on Bonel's Farm! The floating form looks very like a *Callitriche*. ii. S. de Palma, *Rev.*

Chætonychia cymosa Wk. Dry gravelly and sandy places; occasional; 4–6. A small slender erect annual. I. *Boiss.* III. i. Queen of Spain's Chair near Pedrera! Linea, *K.* Alcadeza Plain! ii. or iii. Sands near Palmones, *Rev.*

Paronychia echinata Lamk. Dry sandy, stony or gravelly hills; rather frequent; 3–5. III. i. Queen of Spain's Chair to Alcadeza! iii. Palmones Sands!

P. argentea Lamk. (*P. hispanica* Clus.). In dry, mostly very sandy places; abundant; 1–5. I.! II.! III.! My 285 from Neutral Ground closely resembles this, but has narrow leaves, no petals, and muticous sepals. It may be a distinct species.

Lœflingia micrantha B. & R. In deep sand; very local; 4–6. A small glutinous, subleafless annual, very like *L. hispanica* in appearance, but with 5, not 3, stamens, and outer, not all, sepals aristate on either side. III. ii. and iii. Sands near Palmones, on both sides of river!

L. sp.? (No. 1716). A small slender leafy annual, apparently of this genus, just below cottage at Waterfall! I have not seen it in flower.

Polycarpon tetraphyllum L. f. Dry roadsides, sandy fields and waste places; abundant; 3–6. I.! II.! III.!

Var. *alsinoides* Gren. Less branched, flowers fewer, rather large, in small compact cymes. III. iii. Palmones Sands!?

Var. *floribundum* Wk. Much branched, flowers very numerous, in dense cymes covering whole plant. III. i. Bonel's Farm!?

CRASSULACEÆ.

Umbilicus pendulinus DC. Rocks, walls and banks; very common; less so on Rock; 5–6. Cauline leaves often laterally petioled, all crenate. I.! III.!

†Var. *truncatus* W.-Dod, in Journ. Bot. 1914, p. 12; has all leaves, even radical, laterally petioled, rather deeply lobed. III. iii. Roofs at Palmones!

U. horizontalis DC. Similar places; common, especially on Rock; 5–6. Flowers greenish white, ovoid, about 3 lines long, capsules long, lanceolate, acuminate. I.! III.!

†*U. citrinus* W.-Dod in Journ. Bot. 1914, p. 12. Sandy banks; rare; 5–6. Much taller, flowers long, cylindrical, yellow, capsules short, linear-oblong. III. i. By Almoraima Soto! Valley opposite Long Stables!

[*U. Winkleri* Wk. is now referred to *Sedum Winkleri*.]

Pistorinia Salzmannii Boiss. Sandy ground; locally common; 5–6. Flowers bright yellow inside, dull reddish outside. III. i. Cork Woods! By Lajo near Second Pine Wood! ii. Cortijo Trinidad! iii. Near Almoraima!

Sempervivum arboreum L. Rocks; locally common; 1–3. I. Bungalow! From Governor's Cottage to below Mediterranean Road!

†*Sedum amplexicaule* DC. Dry stony places; rare; 5–7. Inflorescence very lax, flowers distant, radical leaves setaceous. III. i. Neighbourhood of Gibraltar, *K.* Near San Roque, *D.*

S. altissimum Poir. Similar places; very common on Rock; occasional in Spain; 6–7. I.! III. i. Cork Woods! Alcadeza Crags! ii. Palmones Playazo!

S. acre L. Similar places; rare; 5–6. III. i. Duke of Kent's Farm, *K.*

S. brevifolium DC. Rocks on mountains; locally frequent; 5–6. III. i. Queen of Spain's Chair! Alcadeza Crags! ii. Mountains to summits!

†*S. micranthum* Bast. Stony places; locally common; 5–6. I.! III. ii. Valley north of Waterfall Valley! Only leaves seen.

†*S. Winkleri* W.-Dod in Journ. Bot. 1914, p. 12 (*S. hirsutum* var. *bæticum* Rouy; *Umbilicus Winkleri* Wk.). Rather damp rocks; locally frequent; 5–7. Flowers large, white, in a lax raceme, leaves and inflorescence glandular. Near *S. hirsutum* All., but petals connate in lower part. III. i. Summit of Chair! Alcadeza Crags! ii. Mountains to highest ridge!

FICOIDEÆ.

Mesembryanthemum nodiflorum L. Stony places; rare; 5–6. Leaves cylindrical, pustulate, flowers small, whitish. I. Europa Lighthouse and Glacis! Below Mediterranean Tunnels! III. ii. Algeciras, *D.*

M. crystallinum L. Similar places; rare; 4–6. Leaves flat, ovate, pustulate, flowers large, whitish. III. ii. Near Algeciras, *Née.*

[*M. Aitonis* Jacq., mentioned by Kelaart as cultivated in Gibraltar, is very near the last. I have seen neither.]

[*M. acinaciforme* L. with very large bright purple flowers is extensively planted on forts on the Rock, and about cottages in sand-dunes in Spain, and is becoming naturalized.]

[*M. crassifolium* L.? is planted at Governor's Cottage, and has become quite naturalized on rocks near the Lighthouse.]

[CACTEÆ.]

[*Opuntia.* One or two species are commonly cultivated and grown as hedges, occasionally growing subspontaneously.]

SAXIFRAGACEÆ.

Saxifraga globulifera Desf. var. *gibraltarica* Boiss. Rocks, old walls and stony *débris*; locally common; 3–5. I. Northern slopes and precipices from Rock Gun to Castle, and *débris* slopes below! Mediterranean Steps!

UMBELLIFERÆ.

†*Sanicula europæa* L. Shady woods; rare; 4–6. III. ii. Top of Waterfall Valley!

Eryngium ilicifolium Lamk. Sandy ground near sea; rare; 6–8. Annual with small heads. A specimen in herb. Balestrino so labelled, without locality, is *E. maritimum*, which Kelaart also records. I. North Front, eastern side, rarely, *K.* II. *K.* III. i. Linea, *K.*

E. tricuspidatum L. Dry fields and heathy places; occasional; 6–8. Radical leaves oval cordate, dentate, rarely lobed, cauline with narrow-linear segments, heads small, sessile. III. ii. S. de Palma in Los Barrios district, *Rev.*

E. maritimum L. Sea sand; occasional; locally common; 5–7. I. North Front! II.! III. i. or iii. Near R. Guadarranque, *K.*, *D.* ii. Sandy Bay!

E. aquifolium Cav. Cultivated or fallow fields; locally common; 6–7. Radical leaves oblong, subentire, cauline very undulate and spinose-lobate, rarely all subentire. III. i. About San Roque, especially north of it! ii. About Railway near Algeciras!

E. dilatatum L. Dry heaths and fields; frequent or common; 6–8. Radical leaves subpalmately bipinnatisect, lobes lanceolate, incised-spinose, petiole winged and spiny to base, cauline pinnatifid with broadly linear segments. III.!

Scandix Pecten-Veneris L. Dry cultivated fields and rough ground; frequent; 2–5. I. Levant! Near O'Hara's and Breakneck! III. i. San Roque, especially north! Near First Pine Wood! ii. Algeciras Station! El Saladillo! Near Sandy Bay!

Conopodium capillifolium Boiss. Dry heathy places; locally common; 6–7. Near *C. denudatum* Koch, but leaf segments longer and narrower, fruit and involucel longer. In my 2079 the involucel is abnormally long, often much exceeding fruit. III. i. By Second Pine Wood! ii. Slopes beyond Waterfall!

Ammi majus L. Dry fields and roadsides; frequent; 5–7. Varies much in height and leaf cutting, from 1–2 to 6 ft., flowers very white, involucre pinnatisect. III. i. About San Roque!

ii. About Algeciras, but rare south of it! iii. Near Los Barrios Station and elsewhere!

Var. *glaucifolium* G. & G. Stem whitish, leaves bipinnate, glaucous segments linear, entire, pedicels and involucels shorter. III. ii. Near Algeciras, *Rev.*

A. Visnaga Lamk. Cultivated fields; locally abundant; 6–7. Leaves more numerous, very finely divided. III. i. Between San Roque and S. Lorca! Road to Malaga Gardens! Near First Venta! Almendral! River above Almoraima! iii. A single plant by First River Ferry!

Apium graveolens L. Marshy places; rare; 6–9. I. or II. *K.*, either on North Front or Neutral Ground. III. i. Almoraima Soto! iii. Salt Pans! Guadacorte Marshes!

Helosciadium nodiflorum Koch. Streams and ditches; common; 4–7. Very variable; stout, erect, 3–4 ft., or small, decumbent. II.! III.!

Var. *ochreatum* DC. is a very dwarf creeping form. II. *D.* I have only seen decumbent forms of type here, much larger than var. III. i. Mouth of Guadarranque, *D.* Over Pindalista!

Pimpinella villosa Schousb. Dry bushy or sandy ground; rather locally frequent; 7–9. About 1 ft. high, much branched, leafless above, branches deflexed in bud, radical leaves rosetted, bipinnate, with rather large segments, pedicels and petals very villous. III. i. On and below Cork Wood Crags! iii. A single plant at Palmones Village!

Ridolfia segetum Moris. Cornfields; very common; 4–5. Tall, annual, leaf segments capillary, flowers yellow. [I. A casual on Europa Glacis!] III.!

†*Petroselinum peregrinum* Lag. Rough stony places; rather rare; 4–5. Tall, leafy, flowers greenish yellow, leaf segments broad, fruit laterally compressed, involucre 1–3, involucel several. I. Catchment below Rock Gun! Buffadero Gate! III. ii. Algeciras, *Fritze.*

Bupleurum protractum Hoffm. & Link. Cultivated fields; frequent; 4–6. I. North Front, *Frere.* III. i. San Roque, especially north! River bed above Almoraima! Queen of Spain's Chair! ii.!

B. paniculatum Brot. Dry heathy and bushy places; locally frequent; 6–7. Much branched, very slender, leaves long, narrow lanceolate. III. i. First Pine Wood! Cork Wood Crags and below!

†*B. foliosum* Salzm. Stony slopes and rocks on mountains; locally common; 7–8. Stout, simple, leaves close set, lanceolate, longly acuminate, panicle branched. III. ii. Mountains!

B. gibraltaricum L. Rocky places; rare; 6–8. 2–3 ft. high, leaves mostly radical, twisted so that faces are vertical, involucre and involucel persistent. I. *Lem.*! Above St. George's Hall, and towards Europa, *Webb, Boiss.* A specimen so named from Kelaart is *B. fruticosum.*

B. fruticosum L. Similar places; locally frequent; 6–8 Shrub, 4–6 ft. high, leaves scattered, elliptical lanceolate, involucres very deciduous. I. Signal Station to Breakneck Battery! Between Ince's and Signal Station! Buena Vista Gorge! Near Farringdon's!

Crithmum maritimum L. Maritime rocks; locally common; 6–10. Perez Lara says it is common all round the coast. I have not seen it off the Rock. I. All round, chiefly at Europa!

Kundmannia sicula DC. Rough and grassy hills; common, locally abundant; 5–6. Short, with radical rosettes of pinnate leaves, segments broad, flowers yellow, involucres many, reflexed. I. About Willis's! Engineer Road! III.!

Œnanthe fistulosa L. Marshes; locally abundant; 4–6. Stems soft, flexible, fistular. III. iii. Guadacorte Marshes!

Œ. globosa L. var. *elata* P. L. Damp hollows and by streams; common; 4–6. Fruit much inflated, in a subglobose head. The type is 6–12 in. high, with 5–6 rays, only 2–3 fertile; it is not recorded. Var. *elata* is taller, 3½ ft. high, rays 8–15, all fertile. II.! III. i. and ii.!

†Var. *Kunzei* Lge. is intermediate in height, with 8–10 rays (the outer barren?), and pedicels thick even in flower. It is the only form hitherto recorded for our region. III. i. Between Gibraltar and San Roque, *Wk.*, *K.*, *D.* ii. Algeciras, *Rev.*

Œ. peucedanifolia Poll. Damp marshy places, often in clumps of *Juncus*; locally common; 6–8. Leaves all subsimilar, root fibres ovoid, or at least thickened. III. ii. Estuary near Reina Cristina Hotel! iii. Guadarranque Marshes!

Œ. pimpinelloides L. Dry places, chiefly in woods; very common; 4–6. Segments of radical leaves much broader than those of stem; root fibres with an ovoid or subglobose tuber near end. I. *K.* III.!

Œ. crocata L. By running water; locally frequent; 4–6. [II.? *D.* Surely *Œ. globosa* has been mistaken for it?] III. i. Queen of Spain's Chair! ii. Mountains!

Var. *apiifolia* P. L. has a colourless, not ochreous, root juice, and is usually regarded as synonymous. III. i. Between Gibraltar and San Roque, *Wk.*

Fœniculum officinale All. (*Anethum Fœniculum* L.). Dry hill slopes and banks; rare? 6-8. Perez Lara says it is as common in the province as next, but all I have seen is referable to *F. piperitum.* I. *K.*, *D.* III. ii. Algeciras, *Rev.*

F. piperitum DC. Similar places; very common; 6–10. Differs chiefly in its long narrow panicle of sublateral umbels, with much fewer rays, and fewer leaves with shorter segments. I.! III.!

Magydaris panacina DC. Dry slopes; locally frequent; 6–7. Tall, white-flowered, leaves all radical, with few very large segments, inflorescence and fruit pubescent. I. From Ince's to Signal Station! Near Michael's Cave! III. i. First Pine Wood! Alcadeza Crags! Cork Woods! ii. Waterfall Valley! Carnero Hills!

Torilis nodosa Gaertn. Roadsides, and waste places; common; 4–5. I.! III.!

T. neglecta Roem. & Schult. Ditches and hedgebanks; very common; 4–6. Near *T. infesta* Hoffm., of which some consider it a variety, but much taller, branched above only, with habit of *T. Anthriscus* Gmel. *T. purpurea* Guss. is a form with purple stem and fruit spines. I.! III.!

Caucalis leptophylla L. Bushy ground and cultivated fields; rare? 3–6. Annual, short, much branched, umbels small on short sublateral peduncles, fruit linear oblong, with long spines. I. About the middle part of the Rock, *K.*, *Boiss.*, *&c.* III. ii. Algeciras, *Rev.* A single plant by railway near aqueduct!

Orlaya platycarpos Koch. Sea sand; rare; 4–5. Annual, suberect, glabrous, involucres broad, hyaline, flowers white, broadly radiant. I.? *K.* Probably Neutral Ground. II. *K.*, *D.* III. iii. East end of Bay, near the Guadarranque, *K.*, *D.*

O. maritima Koch. Sea sand; common; 4–5. Dwarf, pubescent, involucre narrow, herbaceous, flowers small, pink, hardly radiant. I. Catalan Bay! North Front! II.! III.!

Daucus crinitus Desf. Grassy or sandy fields and hill slopes; rare; 6-7. Leaves glabrous, segments verticillate. I. *Pourr.* III. i. Campamento Common! Not in flower. ii. About Algeciras, *Rev.*

D. Carota L. Grassy or rough hills and banks; common; 4–7. Most variable; umbels flattish in flower, concave in fruit, spines distinct, short or long. *D. maritimus* Lamk., smaller and more slender, with thicker glabrous, shining leaves, and *D. maximus* Desf., taller and stouter, with large broad leaves, and larger flowers but smaller fruit, are reduced to varieties by Perez Lara. I.! II.! III.! My 1236 from railway near Algeciras may be *D. maximus*.

D. gummifer Lamk.? Rough places near sea; locally frequent? 5–8. Umbel convex in flower and fruit, branches divaricate, leaves thicker, peduncles stout, fruit spines short, confluent at base into a wing. The Gibraltar plant agrees except in fruit, which does not differ from that of *D. Carota*. *D. gingidium* L. is not synonymous, as Kelaart and Debeaux say; it has a concave umbel and different habit. I. Governor's Cottage! Mediterranean Steps!

D. muricatus L. Field borders and roadsides; very common; 4–6. Flowers large, very white, fruit with long slender spines. II.! III.!

Elæoselinum fœtidum Boiss. Sandy flats and mountain slopes; common; 5–6. Tall, flowers yellow, leaves much divided, petioles hispid, involucre 0–1, involucel several, fruit dorsally compressed, with a broad wing, which, as in *Thapsia*, is not developed till maturity. I.! III.!

E. Asclepium Bert. (*E. meoides* Koch., *E. tenuifolia* Lge.). Heaths; rather rare; 6–7. Rather tall, slender, involucres 3-4, rays long, 8–12, leaves palmately divided, two lowest lobes short and directed downwards, each lobe rather narrow, tripinnatisect, ultimate segments rather short, narrow and apiculate. III. i. Northern slopes of Chair!

Thapsia villosa L. Bushy mountain slopes; locally common;

4–7. Much like *Elæoselinum fœtidum*, but no involucres, leaves adpressed to ground, with fewer, broader blunter segments. The type has bi- or tripinnatisect leaves, segments short and rather small. I.! III. Mountains!

Var. *latifolia* Boiss. differs greatly in much larger, broader, and fewer leaf segments. III. i. Near Almoraima Station, &c.! Alcadeza Crags! ii. In and about Palmones Pinar!

T. garganica L. var. *decussata* DC. Sandy and bushy places; rather frequent; 4–8. Leaves very pilose, decussately pinnate, segments broad, decurrent, not all in one plane. I.? Dry hills at Gibraltar, *Née*. Probably in Spain, not on the Rock. III.!

Bifora testiculata Spreng. Cornfields; rare; 4–5. Fruit didymous, very rugose. Not synonymous with *Coriandrum sativum* L. as Debeaux makes it. III. Between Gibraltar and Algeciras, *D.* i. San Roque, Campamento, &c., *Frere*.

Capnophyllum peregrinum Lamk. Cornfields; very common; 4–5. Annual, very glaucous, divaricately branched above, umbels subsessile, flowers small, white, fruit transversely plicate. III. i. and ii.!

Ferula communis L.? Dry bushy slopes; rare or error? 3–5. Leaves flaccid, ultimate segments long, narrow linear, entire. I think the next species may have been mistaken for this, though the record is by Lemann, who is usually accurate. I.? *Lem.*

†*F. tingitana* L. Similar places; locally very common; 3–5. The stoutest and earliest yellow umbellifer, leaves very large, much dissected, subcoriaceous, very shining, ultimate segments oval and lobed, fruit oval, with a thick border. I.! III.? Near Gibraltar, *Fritze*, *Winkl.* This may refer to the Rock itself, I never saw it elsewhere.

Opoponax Chironium Koch. Rough places; rare; 5–6. Rather like *Kundmannia sicula*, but much larger and more branched, pubescent, rays 20–30, involucres few, fruit dorsally flattened, ribs keeled, margin thick, obtuse. III. ii. Near Algeciras, *Winkl.*

Hippomarathrum Pterochlænum Boiss. Sand-dunes; locally abundant; 5–6. II.! III.!

H. Bocconi Boiss. Similar places; rare; 5–6. Half the size, fruit smaller, with smooth, not papillose ribs, all involucres entire. Smooth fruits are by no means always associated with entire involucres, they are much divided in Ball's specimen. II. *Ball*! III. ii. Near Algeciras, *Winkl.*

Smyrnium Olusatrum L. Waste and bushy places; abundant on Rock, occasional in Spain. I.! III. i. Malaga Gardens! iii. About Guadacorte!

Conium maculatum L. Waste places and field borders; rare; 5–6. I. Burial Ground, *K.* This may be North Front or Sandpits. A single plant on North Front! III. i. By river at Almoraima! ii. Carnero Hills!

ARALIACEÆ.

Hedera Helix L. Rocks and walls, but chiefly in woods; locally common; 9–1. I. In gardens or on buildings, but native in many places! III. i. and ii. Abundant in mountains, rare elsewhere!?

CAPRIFOLIACEÆ.

Lonicera implexa Ait. (*L. Caprifolium* Desf.). Bushy mountain slopes; common on Rock, occasional in Spain; 5–6. I.! III. i. Queen of Spain's Chair! Alcadeza Crags! Malaga Gardens! Cork Woods!

Var. *puberula* P. L. Leaves pubescent beneath, corolla glandular, villous or glabrous. III. ii. Slopes beyond Waterfall!

L. Periclymenum L. Woods and bushy places; occasional; 5–7. Perhaps more frequent than my stations show. [I. Introduced, *K.*]

Var. *hispanica* Ball. Leaves softly pubescent both sides, pedicels, calyx and corolla densely glandular. III. i. Cork Woods! ii. S. de Palma, *Rev.* iii. Guadacorte Marshes!

Sambucus nigra L. Woods and near cottages; occasional; 4–6. [I. In hedges and gardens, *K.*] III. i. Cork Wood Sotos! Above Almoraima! About San Roque and towards Station! ii. By Miel, &c., about Algeciras! El Cobre! M. de la Torre!

S. Ebulus L. Waste places near habitations; rare; 6–7. III. ii. Above Miel Bridge! Below Palmones new bridge!

Viburnum Tinus L. Woods; locally frequent; 3–4. III. i. Queen of Spain's Chair, leaves only!? Cork Woods! ii. Upper mountain slopes!

RUBIACEÆ.

Sherardia arvensis L. Grassy places, fields and woods; abundant; 2–6. I.! II.! III.! With pure white flowers near Algeciras!

Asperula arvensis L. Cornfields and open places; rare; 4–5. Annual, flowers deep blue, involucred by glabrous leaves. III. i. Long Stables! Slopes of San Roque, *D.* ii. South of Algeciras!

A. hirsuta Desf. Stony slopes and fields; rare; 4–5. Perennial, flowers rose, panicle leaves much shorter, glabrous. I. *K.* III. i. Slopes of San Roque, *D.* Pinar del Rey, *Porta & Rigo*!

Crucianella maritima L. Sand-dunes; rather frequent; 4–7. Perennial, rigid, scabrous, leaves pungent, short, broad, decussate, flowers yellowish in broad bracteate spikes. I. Catalan Bay! II. *K.*, *D.* III. i. Near Tunares! ii. Palmones Playazo! Sandy Bay! iii. Palmones Sands!

C. angustifolia L. Dry waste places; rare; 5–6. Annual, slender, divaricately branched, leaves short, adpressed, spikes slender. III. i. By Fort San Felipe, *D.* Slopes of San Roque, *D.* ii. Railway near Algeciras!

Rubia peregrina L. Bushy places; very common; 4–6. The type has leaves broadly lanceolate, acuminate. I.! III.!

Var. *latifolia* G. & G. (var. *lucida* Webb). Leaves ovate or obovate-elliptical, shortly and abruptly acuminate. I. *Juss.*, *K.*, *D.* III. i. Slopes of San Roque, *Boiss.* Alcadeza Crags! ii. Mountains, with leaves up to ¾ in. wide!

Var. *angustifolia* G. & G. Leaves linear lanceolate, gradually acuminate. I. *Juss.*, *K.*, *D.* III. i. San Roque, *ib.* ii. Mountains, the commoner form! A very peculiar state (my no. 2241) grows in Palmones Sands, doubtless induced by exposure and absence of material on which to climb. It is dwarf, erect, compact, and little scabrous.

[*Galium gibraltaricum* Schott fil. A doubtful species, described in Deb. Fl. p. 95. Perez Lara thinks it may have been a form of *G. campestre.*]

G. ellipticum Willd. Shady valleys and mountain slopes; locally frequent; 5–6. III. i. Woods near San Roque, *Pourr.* Almoraima, *Reut.* ii. Mountains!

[*G. rubioides* L. Kelaart was informed that this grew in Gibraltar, but it has not been confirmed.]

G. palustre L. var. *elongatum* G. & G. Marshes and ditches; occasional or locally frequent; 5–7. III. i. Cork Wood Sotos! Lajo Marshes! ii. Shore marshes near Algeciras, *Rev.* iii. Guadacorte Marshes!

G. campestre Schousb. Cultivated and fallow fields; frequent; 5–6. I. *P. L.* III. i. Campamento Common! Alcadeza Crags! Around San Roque! ii. Carnero and Algeciras Hills! iii. Salt Pans!

[*G. viscosum* Vahl. (*G. glomeratum* Desf.) is recorded by Kelaart from the Spanish Racecourse, doubtless in error for the last.]

G. divaricatum Lamk. Dry grassy or stony places; rare; 5–6. Very near next, but panicle broader, laxer, branches elongate and filiform, leaves not reflexed. I. *Pavon.* III. i. San Roque, *Reut.*, *D.* ii. Algeciras, *Rev.* Upper Waterfall Valley!? Perhaps *G. parisiense.*

G. parisiense L. (*G. anglicum* Huds.). Similar places; rather rare; 5–6. III. ii. Algeciras Station! Between El Cobre and El Saladillo!

Var. *vestitum* G. & G. has a hispid fruit. III. i. Campo Common! Railside beyond San Roque! ii. Railside beyond Algeciras!

G. Aparine L. Roadsides, gardens and hedges; frequent; 3–5. I. Chiefly in gardens! Reclamation Road! III.!

G. tricorne With. Cornfields; rare? 4–5. I. *K.* III. i. Near Pindalista! Almoraima!

G. saccharatum All. Dry hills, banks, walls, &c.; very abundant; 1–4. Large specimens not in fruit resemble *G. Aparine.* I.! III.!

G. murale All. Walls, rocks and dry places; very common; 1–5. I.! III. i. and ii.!

Vaillantia hispida L. Rocks and old walls; rare? 4–5. Hispid, inflorescence dense, no horn on top of fruit. I. Near Levant Battery!

†*V. muralis* L. Similar places; locally very common; 2–5. I.! Sometimes slightly hispid. My 300, from Catalan Bay, is a very laxly branched form simulating *Polycarpon tetryphyllum.*

VALERIANEÆ.

Valeriana tuberosa L.? Stony or grassy places; rare or error? 4–5. Forms of this often resemble *C. Calcitrapa*, which Kelaart may have mistaken for it. I. South and west slopes, *K.*

**Centranthus ruber* DC. Rocky places, probably not native, but quite naturalised; 4–6. I. Above Devil's Gap, flowers usually white! Parson's Lodge!

C. Calcitrapa DC. Rocks, old walls and stony places; frequent? 4–6. Very near next, but usually shorter and more slender, cymes more compact, and corolla tube only as long as achene. I. About Willis's! III. i. Cork Wood Crags! ii. Palmones Playazo! I think it occurs in many other places, but I had difficulty in distinguishing it from next.

C. macrosiphon Boiss. Similar places, and in deep sand; much commoner; 3–7. Usually much stouter, corolla tube 3 times as long as achene. I.! III.!

Fedia Langei Pom. Cultivated fields, &c.; abundant; 1–5. Known from next by oblong-linear fruit. The relative lengths of corolla tube are not reliable, and the species are indistinguishable in flower. I believe both are equally common I.! II.! III.!

F. graciliflora Fisch. & Mey. (*F. Cornucopiæ* Gaertn.?). Similar places; abundant; 1–5. Fruit suborbicular, more or less inflated. Perez Lara gives the synonymy cited, but Pomel shows that there are differences (*Vide* Deb. Fl. pp. 98–99). I.! III.!

Valerianella microcarpa Lois. Dry fields and grassy places; rather rare; 2–4. A slender annual, fruit the smallest of our species, less than ½ line long, calyx limb very small, obtuse. III. i. Path above Bonel's Farm! West slopes of Queen of Spain's Chair! Cork Woods!

V. truncata Betcke. Similar places; rare; 3–5. Shorter than last, corymb closer, fruit rather larger, calyx limb reticulate, apiculate, as long and as broad as fruit. III. i. Riverside above Almoraima!

†*V. carinata* Lois. Similar places; rare; 3–5. Flowers in dense globose heads, fruit 1¾ by 1¼ lines, prominently ribbed, crown hardly distinct from body. III. i. By Soto Gordo!

V. coronata DC. Sandy cultivated or fallow fields; rare; 4–5. A stout annual, very like next, but calyx campanulate, glabrous within. Kelaart wrongly makes them synonymous. III. i. Near San Roque, *Wk.* ii. Near Algeciras, *Rev.*

V. discoidea Lois. Similar places; frequent; 4–5. Calyx subrotate, tomentose within. I. Moorish Wall! Near Michael's! Engineer Road! III. i. Near Campamento Cemetery! San Roque, especially on north side! Cork Wood Crags! ii. Near Algeciras Cemetery! iii. Near Guadacorte!

DIPSACEÆ.

Dipsacus sylvestris Mill. Damp grassy places; common; 6–7. Central scales of inflorescence often long, forming a coma as in *D. ferox*. III.!

†*Cephalaria syriaca* Schrad. Dry fields; rare, probably casual; 6–7. Annual, 6–18 in. high, heads small non-radiant, pale blue or lilac, pales and involucre longly mucronate. III. i. San Roque, *K.* Perez Lara wrongly cites the station as Gibraltar.

Pterocephalus Broussonetii Coult. Dry bushy hills and sandy places; frequent; 5–6. Tall, with smaller blue heads than either of the *Scabiosæ*. II. *Deb.* III. i. Cork Woods! Alcadeza and elsewhere! ii. M. de la Torre! Hills north of Algeciras! iii. Near Los Barrios Station! About Salt Pans!

Scabiosa maritima L. var. *grandiflora* Boiss. Dry hills and bushy places; very common; 5–6. The type, not recorded, has heads of medium size, corolla lilac rose, or yellowish, ovate-cylindrical in fruit. Var. *grandiflora* has flowers and heads twice the size, cylindro-conical in fruit, lower leaves serrate, not deeply incised. I.! III.!

Var. *atropurpurea* Boiss. Flowers dark or blackish purple. The flowers vary in shade, but I have never seen any approaching the *atropurpurea* of horticulturists. I. Rare, *K.* III. ii. Sands at Algeciras, *Nilss.*

S. stellata L. Similar places; rather common, especially in III. ii.; 5–7. I. Rare? III. i. By Lajo! Alcadeza Crags, &c.! ii.! iii. Occasional!

Pycnocomon rutæfolium Hoffm. & Link. var. *bæticum* Lge. (*Scab. urceolata* Desf. var. *bipinnatisecta* Boiss.). Sand-dunes; very common; 5–8. The variety is taller, 2–4 ft., heads twice the size and more radiant, and phyllaries connate to one-third, instead of half their length. II.! III.!

COMPOSITÆ.

Eupatorium cannabinum L. Marshy ground; locally frequent; 6–8. III. i. Cork Wood Sotos!

Bellis annua L. Open grassy places; abundant; 12–5. Small simple forms are var. *minuta* DC. A form with lavender, not at all pink or red ray florets, is abundant on Neutral Ground and by Devil's Tower. I. Behind the Grand Stand and by Devil's Tower! *Débris* at foot of Forts, *K.* II.! III.!

B. perennis L. Similar place; rare? 2–5. Closely resembles small states of *B. sylvestris*, but its disc achenes are glabrous on the edge, not ciliate. The faces in both are puberulous. I.? *K.* III. i. Cork Woods near Almoraima!

B. sylvestris Cyr. Open fields and woods; rare on Rock, abundant in Spain; 11–5. I. Top of Mediterranean Steps and towards Breakneck Battery! Above oil tanks beyond Catalan Bay! III.! Grows 18 in. high in the mountains!

Var. *pappulosa* Lge. Achenes with a short setose pappus, is said to be commoner in the province than type. I. Ravines on west slopes, *K.*, *D.* III. i. South slopes of San Roque, *Boiss*, *D.* ii. S. de Palma, *Rev.*

†*B. rotundifolia* B. & R. Woods and higher mountain slopes; locally very common; 1–5. Willkomm and Lange and Perez Lara state that only var. *hispanica* Wk. is found in Spain. It is stoloniferous and has a much longer pappus. I have dug up dozens of plants and never saw a trace of a stolon, nor is the pappus long. The leaves vary from deeply reniform to truncate, and at lower elevations, where it overlaps *B. sylvestris*, they are

somewhat narrowed below. I suspect the two hybridise. III. i. Queen of Spain's Chair! ii. Mountains!

Conyza ambigua DC. Waste places, roadsides and gardens; frequent; 5–11. I.! III.!

Aster longicaulis Duf. Marshes near sea; locally rather frequent; 9–11. III. ii. Palmones Playazo! iii. Salt Pans!

Pulicaria arabica Cass. var. *hispanica* Boiss. Damp and waste places; ditches and watercourses; frequent; 5–9. The type is not found. A dwarf form is frequent, as at Palmones Village. I. A few plants at waterworks on Willis's Road! II.! III.!

Var. *perennans* P. L. is biennial or perennant, stouter, branches shorter, subpaniculate, leaves very long, and is, I think, frequent. III. i. Railside near San Roque Station, and elsewhere!

P. dysenterica Gaertn. †var. *hispanica* Wk. Marshes; locally frequent; 7–9. The variety is puberulous, not woolly, leaves flat, cordate, not undulate and acutely auricled. Often 3–4 ft. high. III. i. Cork Wood Sotos! ii. Algeciras, *Rev.* iii. Guadacorte Marshes! Salt Pans!

P. odora Reichb. Heaths and sandy plains, and in woods; very common; 5–6. III.!

Inula viscosa Ait. Rough stony ravines and watercourses; frequent; 7–11. I.! II.! III.!

†Var. *laxiflora* Boiss. has heads longly peduncled and distant, in a lax panicle, and occurs frequently with the type. I.! III.!

I. crithmoides L. Tidal rivers; locally common; 9–10. III. ii. and iii. Palmones River, both sides! Aguacorte River! Palmones Playazo! Salt Pans!

Asteriscus maritimus Moench. Dry rocky places; locally abundant; 1–12, but chiefly 3–6. Varies much in size and habit. Erect specimens look very like *A. aquaticus*, but it is perennial, with the central head peduncled. I.! III. i.? Slopes of San Roque, *K.*, *D.* I strongly suspect that *A. aquaticus* has been mistaken for it here. ii. Carnero Point!

†*A. brachiatus* Jord. & Fourr. Similar places; rare? 3–6. III. i. Algeciras, *Rev.* Probably at Carnero Point, whence my specimens do not differ appreciably from last, of which this may be only a slight variety.

A. aquaticus Moench. Dry fields; common; 5–6. Annual, like *A. spinosus*, but with more divaricate branches; soft involucre tips, and central head closely sessile. III. i. Carteian Hills! North of San Roque! ii. Hills round Algeciras! Carnero Hills! iii. Palmones Village!

A. spinosus G. & G. Dry hills and bushy places; common; 4–6. I.! III.!

Var. *aureus* Wk. Rays much wider. III. ii. As common as type near Algeciras, but not seen elsewhere!

Pideræa fuscata Webb. Cultivated and fallow fields, and roadsides; very common, 12-6. Pales between florets, tube of latter flattened and winged, prolonged into a cap over achene. I. Near Inundation, *K.* Not there now I think. II.! III.!

†*Anthemis arvensis* L. Sandy and gravelly heaths; occasional

or frequent; 3–6. Pales of receptacle becoming conspicuous as flowers fade, tube of florets not prolonged, achenes ribbed, not tuberculate. Much resembles *Ormenis mixta*. The type and variety run into one another, but Perez Lara records var. only. I. *K.* II.! III. i. Bonel's Farm! ii. Palmones Pinar!

Var. *incrassata* Boiss. Peduncles greatly thickened after flowering, almost tubiform. III. i. Pinar de los Bigotes! iii. Palmones Marshes!

A. Cotula L. Similar places; occasional, or here and there abundant; 5–7. Aromatic, leaf segments capillary, pales not conspicuous, narrow, achenes tuberculate. III. i.! ii. El Cobre!

A. maritima L. Sand-dunes; locally plentiful; 5–7. Perennial, in dense tufts, leaf segments thick, deeply punctate. I.? *K.* II. *K.*, *D.* Probably not also in I. III. i. Hedge at Bonel's Farm, an abnormal drawn up form! ii. and iii. Mouth of Palmones River, both sides! "Mountains above Algeciras," *B. & R.*! An unlikely station, probably the shore is meant.

Ormenis mixta DC. Sandy heaths, &c.; abundant; 5–9. Annual, prostrate and rooting, or suberect and tall, leaves narrow spathulate, terminal pinnæ the longest, pales folded over achenes, tube of disc florets expanded and spurred at base. II.! III.!

Achillea Ageratum L. Dry places in rather stiff soil; occasional; 5–10. Rigid, erect, heads yellow, small, in a compact corymb. III. i. Alcadeza! Magazine Hill! Malaga Gardens! Second Venta! By upper ford over Lajo! &c. iii. Near Los Barrios Station! Guadacorte!

Diotis maritima Sm. Sand-dunes; locally common; 6–7. II.! III. ii. Sandy Bay! Beyond Carnero Point!

Anacyclus radiatus Lois. Fields, roadsides and waste places; very common; 4–6. Usually tall and stout, sometimes prostrate, two outer lobes of disc florets much larger. I.! II.! III.!

†Var. *purpurascens* DC. has ray florets red on back. I. Less common than type, *K.* III. i Noted, but no stations recorded! ii. Algeciras, much rarer than type, *K.*, *D.*

A. clavatus Pers. Similar places; rare? 4–6. Ray white, shorter, phyllaries without a broad appendage. II. Two specimens, one rayless! III. ii. Palmones Pinar! Algeciras Station!? iii. Hills near Los Barrios Station!

[*Cladanthus arabicus* Cass. (*C. prolifera* DC.), a yellow-rayed annual, with long proliferous branches from below the central head, and leaves with linear segments, is recorded from Gibraltar by Kelaart only.]

Matricaria glabra Lag. Fallow fields and waste ground; very common; 4–5. No pales between florets, achenes curved, with auriculate pappus, ray achenes connate with involucre, leaf segments linear, not setaceous. I. Above Willis's! II.! III.!

[*M. discoidea* DC. (*M. suaveolens* Buch.), a roadside casual near Algeciras bull-ring.]

Prolongoa pseudanthemis Kunze. Sandy heaths; locally common; 3–4. A small annual, leaves pectinipartite with short entire lobes, peduncles very long, ray white, becoming carmine. III. i. By Second Pine Wood!

Chrysanthemum segetum L. Cornfields; common; 4–5. Leaves, at least lower, trifid, lobes deeply incised. I. Abundantly in gardens, *K.* III.!

Pinardia coronaria Less. Roadsides, banks and fields; very common; 3–6. Ray pale yellow, or deep yellow towards base, or wholly deep yellow, the latter the rarest. I.! II.! III.!

†*P. anisocephala* Cass. Sand-dunes; locally abundant; 4–6. Tall, glandular viscid, with entire or toothed leaves. III. ii. and iii. Guadacorte and Palmones Sands, both sides of River! "Mountains above Algeciras," *B. & R.*, doubtless a misuse of collectors' printed labels.

†*Coleostephus Myconis* B. & R. Sandy fields; rare, but perhaps mistaken for *Chrysanthemum segetum*; 3–5. A glabrous yellow-rayed annual, leaves acutely serrate, achenes with a tubular crown. I. Sandy fields, *K.* III. ii. Near shore at Algeciras, *B. & R.*

**Artemisia pontica* L. Fields; frequent; 7–10. Ashy green, herbaceous, 12–18 in. high, leaves short, bipinnatifid, segments linear, heads small, hemispherical, bright yellow. I have only seen very late specimens, and have not collected it. I think much more general than my notes show. [I. A doubtful native, *D.*] III. i. Carteian Hills, especially near Francia's Farm! iii. About Los Barrios Station!

†*Helichrysum rupestre* DC. var. *Boissieri* Wk. (*H. Fontanesii* Camb.). Rocks; locally frequent; 5–6. Stems few or solitary, leaves broadly linear, corymbs and heads rather large, phyllaries glabrous. The description emphasises that all phyllaries are as long as florets; they are certainly not so in our plant, and hardly differ from those of *H. Stœchas.* The plant is said to be inodorous. I have not tested this. I. All over upper Rock, especially on precipices!

H. decumbens Camb. Rocks; rare; 5–6. Much smaller and more decumbent, leaves close set, shorter, soon reflexed, heads smaller, fewer, deeper yellow. I. *Boiss.*!

H. Stœchas DC. Rocky slopes; locally common; 5–7. Like *H. rupestre,* but strongly aromatic, much more cæspitose and many-stemmed, leaves much narrower, heads smaller, in smaller clusters, often paler yellow. III. i. Cork Wood Crags! Alcadeza Crags!

H. serotinum Boiss. (*H. angustifolium* DC.). Sand-dunes; locally frequent; 7–9. Densely cæspitose, many-stemmed, leaves very narrow, anthodes smaller and more cylindrical than in other species, outer phyllaries woolly on back. Leaves canescent or quite green. III. ii. and iii. About Palmones, on both sides of River!

Gnaphalium luteo-album L. Sandy places; occasional; 3–8. I. North Front, near Catalan Bay, *D.* III. i. Along the Lajo! Almoraima! Alcadeza! ii.! iii. Salt Pans!

Filago germanica L. Fields and waste places; rare? 5–6.

Erect, branched above only, branches ascending, leaves narrow, acute, not overtopping heads, heads 20–40 in cluster, obscurely angled. I. Rare, *K.*

†*F. apiculata* G. E. Sm. Similar places; frequent? 5–6. Upper leaves obtuse, apiculate, heads fewer in clusters, deeply 5-angled. Very near last and next, perhaps confounded with either. III. i. Campamento Common!

F. spathulata Presl. Similar places; very common; 5–6. Horizontally branched from base, inflorescence proliferous, leaves broader, obtuse, undulate, heads fewer in clusters, deeply grooved.

Var. *prostrata* Wk., prostrate, and var. *erecta* Wk., erect, grow together. II. *D.* III.!

F. arvensis L. Similar places; rare? 5–7. Slender, erect, leaves linear, floral shorter than clusters, phyllaries not embracing achenes. II. *K.* III. i. Near San Roque, *Brouss.*

F. gallica L. Similar places; very common; 5–6. Floral leaves much longer than clusters, phyllaries embracing achenes. I. South and west slopes, *K.*, *D.* III. i. and ii.!

Phagnalon saxatile Cass. Dry rocky places, walls and sand-dunes; frequent, abundant on Rock; 3–6. I.! III. i. Campamento Common! Carteia! Cork Wood Crags, &c.! ii. Near El Cobre! Palmones Playazo! Carnero Point! iii. Guadacorte!

Evax asterisciflora Pers. Dry sandy soil; rare? 4–6. Involucrating leaves acute, pales of receptacle cuspidate, anther tails short, dentate. III. ii. Algeciras, *Winkl.*! The specimen looks to me more like next.

E. pygmæa Pers. Similar places; common; 4–6. Very like last, but smaller, involucral leaves obtuse, pales acute, anther tails linear, entire. III. i. River bed at Almoraima! iii. Gardens at Salt Pans! This or the last grows in many other places, but I did not learn to distinguish them.

†*E. Cavanillesii* Rouy. I know nothing of this beyond Debeaux's note in Fl. p. 107. III. ii. Dry sandy hills at Algeciras, *Rev.*

Senecio Lopezii Boiss. Woods; locally frequent; 4–5. A tall handsome species, leaves large, undivided, heads large, corymbose.

†Var. *minor* Wk. (*S. gibraltaricus* Rouy), the only form recorded, seems indistinguishable from type. III. i. Cork Woods! ii. Neck above Pelayo, and slopes of El Frayle Ridge! Summit of S. de Palma, *Rev.*

**S. Cineraria* DC. is quite naturalised about Europa Glacis and Flats and by Governor's Cottage!

S. foliosus Salzm. Damp grassy places, and by watercourses; frequent? 6–10. Near *S. Jacobæa* L., but shorter, and inflorescence laxer. Its late flowering gave me little opportunity of distinguishing it from *S. erraticus.* I. Catchment below Rock Gun! A specimen or two below Breakneck Battery! Above Main Road near Alameda (*K.*, as *S. Jacobæa*). II.! Varying in leaf cutting, perhaps both species occur. III.!

†Var. *suffrutescens* Wk. is woody at base, leaves thicker, sub-

fleshy, peduncles stouter, bracts more numerous. I. Western slopes, *Wk.*

S. erraticus Bertol. Similar places; common? 6-10. Near *S. aquaticus* Huds., but with lax paniculate, not corymbose inflorescence, leaves much less divided than in last. II.!? III. i. and ii.!

S. gallicus Chaix. Sand-dunes and light soil; locally common; 1–5. A rayed annual, inflorescence corymbose, leaves all pinnatisect. The type (var. *laxiflorus* DC.) has an external calycule of short phyllaries. I. At and beyond Governor's Cottage!

Var. *exsquameus* DC. has no calycule. III. i. and iii. Sand-dunes at Linea and Palmones! Dautez says type and var. are indiscriminately mixed. I have found type only on the Rock, and only var. in Spain.

S. petræus B. & R.? Rocky slopes rare; 4–6. Annual, stout, rather tall, stem leaves entire, broadly amplexicaul, upper sometimes inciso-dentate, anthodes few and large. I.? *Dasoi.* This collector's records are not reliable.

†*S. leucanthemifolius* Poir. Sandy places; rare; 3–4. A low annual, often much branched, leaves inciso-dentate, not lobed, corymb few-headed, heads larger than those of *S. gallicus.* I. Sandy grassy places on west side of Rock, *D.*

S. minutus DC. †var. *gibraltaricus* Wk. Shady rocky places; rare; 5–6. Heads few, rather large, on long subradical peduncles, radical leaves dentate, cauline simply pinnate, lobes linear, sometimes dentate. I. *Lem.*! Both sides of Rock, *Wk.*, *Boiss.*, *&c.* Kelaart indicates the Governor's Cottage as its habitat, where I have repeatedly searched in vain for it.

S. lividus L. var. *major* G. & G. Shady bushy ground; rather rare; 2–6. I. *Lem.*! East slopes, *Wk.*, *D.* III. i. Summit of Chair! Cork Woods! ii. Railside near Algeciras! Waterfall!

S. vulgaris L. Fields, roadsides and waste places; very common; 1–12, but chiefly 12–3. I.! II.! III.! Reaches highest summits!

Calendula arvensis L. Open sandy, stony and grassy places, rarely in mountains or woods; abundant; 11–5. Strictly annual, often subsimple and low, sometimes branched and straggling, like next. Outer fruits erect or incurved, lateral wings broad, spines on back many, large, in two rows, usually a spur inside at base. It varies with deep orange flowers. I.! II.! III.! A field full of the orange-flowered form at Magazine Hill!

Var. *malacitana* P. L. Flowers half the size, ligules often not longer than phyllaries, fruit larger and more spinose. Debeaux admits the var. only, though it is much rarer than type, at least in good forms. I. Below Devil's Gap! III. Rather frequent to Carnero Point!

C. stellata Cav. Rocky and stony slopes; locally common; 3–5. Stout, much more straggling, probably always annual, but often becoming woody at base, flowers as large as next, outer fruits stellately spreading, muricate, not spiny on back, wingless or nearly so, no spur on face at base. I.! III. i. Alcadeza Crags!? Perhaps only large *C. arvensis*, I did not see fruit.

†*C. suffruticosa* Vahl. (*C. marginata* Willd.). Rocky and stony places near sea; locally frequent; 3–5. Always perennial, stouter and more woody, with large flowers, but little differing from last. The synonymy is somewhat involved. I. Maritime rocks near Landport, *D.*, *Rev.*, *Nilss.* O'Hara's Tower!

Var. *tomentosa* Ball (*C. incana* Willd.) is a very white silky form. I. Rocks on north-east slopes near Landport, *K.*, *D.* I suspect the north-west slopes are meant, where it is plentiful, and on the *débris* below! III. i. Slopes of San Roque, *D.* ii. Carnero Point!

Atractylis cancellata L. Dry hills; frequent; 5–6. I. Middle parts of Rock below Michael's Cave, *K.* Europa, *Hurst*! III. i. Opposite Francia's Farm! Carteian Hills! Near Pinar de los Bigotes! Path to First Pine Wood! ii. Beyond Carnero Point! Valley near Frayle Point!

Carlina gummifera Less. Grassy places; locally common; 8–9. III. i. From Campamento to First Pine Wood! ii. Carnero Hills!

†*C. lanata* L. Grassy and stony hills; rare; 6–8. Like next, but stems simple or branched at top, leaves broader, heads solitary, 1–1¼ in. in diameter over ray, inner phyllaries purple. III. i. South slopes of San Roque, *D.*

C. racemosa L. (*C. sulphurea* Desf.). Similar places; abundant; 7–9. II.! III.!

C. corymbosa L. Bushy and heathy places, chiefly on mountains; frequent; 6–7. Much more leafy, with larger heads, 1 in. broad. I.! III.!

Var. *involucrata* Boiss. (var. *major* Lge.) is stouter, sparingly branched at apex only, heads 1½–2 in., floral leaves longer than ray. I think frequent, but have not collected it. I. Herb. Madrid, *teste* Deb.

Kentrophyllum lanatum DC. Open fields; very common; 6–8. Much resembling *Carlina racemosa* when not in flower. Arachnoid-pubescent, leaves glandular-viscid, outer floral bracts erect patent, as long as flowers, heads 1 in. long, achenes and pappus pale. III. i. and ii.!

K. bæticum B. & R. Similar places; rare? 6–9. Stem white, leaves shining, subglabrous, the floral recurved patent, longer than heads, achenes and pappus blackish. Debeaux admits this species only, though it appears much the rarer. I. *Nilss.* III. i. Rough slopes of San Roque and S. Carbonera, *D.* Lane beyond Bonel's Farm!

†*K. arborescens* Hook. Bushy slopes; locally common; 5–6. I. Chiefly south-west, less common north-west, still rarer east slopes! III. i. Carteia, *K.*

Carduncellus cœruleus DC. Rough hills and fields; common; 4–6.

Var. *incisus* DC. has all leaves pinnatifid and spinose dentate, and is said to be commoner. My records are for the aggregate. I. Near Devil's Tower! III.! Chiefly in i.!

Onopordon Acanthium L. Waste places and roadsides; rare;

7–8. Perez Lara only gives one other station in the province, but says that *O. nervosum* Boiss., with glandular, not glabrous corolla is much more frequent. III. i. Between Neutral Ground and Guadarranque, *D.* Campamento and San Roque, *Frere.*

Bourgæa humilis Coss. Dry grassy places; very common; 5–7. Often mistaken for next. Inner phyllaries longly acuminate and spinose, like outer. An albino is rather frequent, and is doubtless the plant referred to as *Cynara alba* by Kelaart. I. Engineer Road! III.!

Cynara Cardunculus L. (*C. horrida* Sibth.). Similar places; rare or error? 5–7. Much taller, with fewer broader leaf segments and rachis, phyllaries with very stout spines, the inmost with an expanded membranous appendage. I much doubt its occurrence. [I. Boiss. ex Deb. Fl. p. 113. Boissier's label reads "between Estepona and Gibraltar"! Kelaart's specimen is *Bourgæa humilis.*] III. i. Dry hills of Campamento, *K.*? San Roque, *D.*?

Notobasis syriaca Cass. Fields; common; 5–6. II. A plant or two! III.!

[*Cirsium lanceolatum* Scop. var. *hypoleucum* DC. is recorded by Kelaart as introduced in Gibraltar. I have seen leaves of what might be this between Guadacorte and the railway bridge.]

C. giganteum Spr. Rather damp places, chiefly near streams; here and there plentiful; 6–8. Often 8–9 ft. high. III. i. First Pine Wood! Rare in Carteian Hills! Near Second Venta! Between Malaga Gardens and Alcadeza! Near Almendral, *K.* ii. Below El Cobre! Near top of Waterfall Valley! M. de la Torre! Carnero Hills!

†*Carduus myriacanthus* Salzm. Sands near sea; rare; 4–5. About 1 ft. high, like a very spiny *C. pycnocephalus*, but phyllaries much narrower, with long spinose tips. *C. Reuterianus* Boiss., which differs in no important character, is frequent in the province. II. Isthmus of Gibraltar, *Wk.*! III. i. Linea, *Porta & Rigo*! About San Roque, *Boiss.*

C. tenuiflorus Curt. Waste places and roadsides; frequent or common; 4–6. Perhaps only a variety of next, with stem winged to top, heads subsessile, densely capitate, &c. I.! III.!

C. pycnocephalus Jacq. Similar places; frequent but less so than last; 4–6. Stem interruptedly winged, naked at top, heads larger and laxer, 2–3 together, the central usually peduncled. I.! II.! III.!

†*C. nigrescens* Vill. Heathy places; rare; 4–7. Like next, but heads smaller and erect, phyllaries more glabrous, not reflexed. I. ? *Dasoi.* III. i. Path to First Pine Wood!

†*C. nutans* L. Similar places; rare; 5–7. III. ii. Near Algeciras, *Clem.*

Silybum Marianum Gaertn. Roadsides and waste places; rather frequent; here and there abundant; 4–6. I. Europa Flats! Jews' Cemetery! North Front! II.! III.!

Galactites tomentosa Moench. Dry rough fields; abundant, often in large masses; 4-6. I. Lower and middle parts, rarely upper Rock! II.! III.!

†Var. *integrifolia* Boiss. Leaves entire or denticulate. It may be common, but I have not seen it. I. *K.*

Serratula bætica Boiss. var. *pinnatifolia* Wk. Wooded slopes; locally frequent; 6–7. Like a dwarf *Centaurea*, but phyllaries long, lanceolate, acuminate into a spine. III. i. Queen of Spain's Chair! ii. Slopes beyond Waterfall! Carnero Hills!

Leuzea conifera DC. Wooded slopes and heaths; rare; 5–6. III. i. Wooded slopes of San Roque, *D.* Alcadeza Plain!

Crupina vulgaris Cass. Stony slopes; rare; 5-6. III. i. Alcadeza Crags!

Microlonchus Clusii Spach. Roadsides and bushy banks; frequent; 4–7. I. Jews' Cemetery! Rosia Parade! III.! Grows 5 ft. high by the Miel!

Centaurea tagana Brot. Woods; locally occasional; 5–6. One of the largest of the genus, with very large heads of dingy yellow flowers. III. i. First Pine Wood! Cork Woods! ii. Upper slopes of Waterfall Valley!

†*C. alba* L. var. *deusta* DC. Dry rocky or sandy slopes; locally frequent; 6–7. Habit of *C. aspera*, but phyllaries lax, ovate, broadly hyaline, with a blackish brown central band. III. i. Alcadeza Crags! Cork Wood Crags!

†*C. sempervirens* L. Woods; rare; 6-7. Tall, much branched, leafy to apex, flowers purple, appendages shortly pectinate. III. ii. Waterfall!

†*C. uliginosa* Brot. Marshes; rare; 6–7. Subsimple, 4–6 ft., leaves very long, narrow, peduncles long, pectinæ shorter and fewer than in last, and erect or spreading, not reflexed. My specimens are taller than the description gives, and have the upper leaves quite entire, not denticulate. III. i. Almoraima Soto!

C. pullata L. Grassy and bushy places, sides of ditches, &c.; very common; 2-5. Dwarf, very leafy, flowers pink or rosy, phyllaries pale green with black edges, appendages reflexed, pectinate. Varies much in habit and leaf lobing. I.! II.! III.!

C. diluta Ait. Rough fields; rare; 5–7. Phyllaries pale, appendages white, shortly lacerate, subdecurrent, terminal 1–3 spines rigid, not longer than others, and erect. III. i. Carteian Hills, a single plant!

†*C. Seridis* L. Sandy ground; rare; 4–6. Perennial, erect, branched, woolly-canescent, leaves longly decurrent, the lower dentate, rarely lobed, heads large, florets purple, phyllaries with 7–11 remarkably long reflexed spines. III. i. Near San Roque, *Ball.*

†Var. *maritima* Lge. differs in very large lyrate-pinnatifid leaves, the cauline less decurrent. III. ii. Sea sand at Algeciras, *P. L.*

C. sonchifolia L. Sand-dunes; rare; 5–6. Somewhat like *C. sphærocephala*, but scabrid-pubescent, leaves shortly decurrent, heads large, disc florets white, phyllaries with 5 rather short reflexed spines. II. Sea sand at Gibraltar, *Brouss.* Probably on Neutral Ground.

C. aspera L. Dry stony and sandy hills; locally common;

5–7. Much branched, 1–2 ft. high, leaves more or less asperous and cinereous, narrow, usually pinnatifid with narrow lobes, phyllaries pale green, spines 3–5, palmate. III. i. Cork Wood Crags! Alcadeza Crags!

C. sphærocephala L. Sand-dunes; very common; here and there abundant; 5–6. Prostrate, heads scarcely radiant, spines of phyllaries 5–7. I. Beyond Catalan Bay! Sentry Fence! II.! III.!

C. polyacantha Willd. Woods, hedges and heathy places; rather frequent; 4–6. Leaves more lobed than last, rays much longer and brighter, spines of phyllaries 9–13. I. *Findlay*!? I believe this species, but not labelled. II. *K.*, *D.* III. i. Carteia, *K.* Second Pine Wood! Pine Wood Plains! Near San Roque Station! Cork Woods! Beyond Alcadeza! ii. Palmones Pinar and Playazo! iii. Guadacorte! Palmones, *Rev.*

[*C. acaulis* Haens. (*C. Hænseleri* B. & R.) is reported by Kelaart from the Carteian Hills.]

C. Calcitrapa L. Waste places and roadsides; very common; 6-8. I. Europa and Windmill Hill Flats! North Front! Glacis! II.! III.!

C. melitensis L. Roadsides and cultivated fields; locally frequent; 5–6. Stem winged, florets yellow, glandular. I. From Middle Gate to Jews' Cemetery! Between Ince's and Castle! III. i. Near Malaga Gardens! Path to First Pine Wood! Campamento Common! ii. Dry hills at Algeciras, *Rev.*

[*C. solstitialis* L. a similar species, but spines much longer and florets eglandular, was found by Kelaart on the Glacis, introduced.]

Echinops strigosus L. Cornfields; locally frequent; 5–6. III. i. Around San Roque, especially on north! ii. Near Algeciras, *Rev.*

Scolymus maculatus L. Fields and roadsides; very common; 5–6. I. Cultivated fields on west slopes, *K.*, *D.*; not there now, I think; there are only one or two small cultivated fields left. By Haynes's Foundry! II.! III.!

S. hispanicus L. Similar places; very common; 5–7. I.! II.! III.!

Cichorium Intybus L. Fields and waste places; common; 5–6. Varies greatly in stature and habit. Only var. *divaricatum* DC. is admitted by Debeaux, which Perez Lara observes is inseparable by any constant character, and the type certainly occurs. Dwarf prostrate forms are frequent, usually the result of browsing by cattle. I. Europa! South Barracks! Queen's Road! North Front! II.! III. i. and ii.!

Tolpis barbata Gaertn. Fields, woods and mountains; very common; 4–6. III.! Chiefly in i.!

Var. *grandiflora* Ball is dwarf, leaves twice as broad, inciso-dentate, heads large, central florets purplish. III. ii. Sands near Algeciras, *Ball.*

Hedypnois pendula DC. Grassy and bushy places; very frequent, at least locally; 3–5. The first three species of this genus are in much confusion. *H. pendula* and *H. tubæformis*, as extremes, are very distinct, but are connected by many intermediates, varying in habit, hispidity, leaf cutting, and inflation of peduncles. I only cite stations in which I have collected specimens. *H. pendula* is erect, usually glabrous, very slender, buds nodding, leaves bright green, flaccid. I. Common on lower parts! III. i. Puente Mayorga!

Var. *pinnatifida* DC. has leaves pinnatifid and phyllaries hispid at tips. Probably frequent. I. Reclamation Road!

Var. *rhagadioloides* Lge. (sub *H. polymorpha*) is similar, but hispid all over. I. Europa Flats! I think frequent elsewhere.

H. cretica Will. (*H. polymorpha* DC.?). Open grassy and sandy places; very common; 3–5. Always more or less prostrate, peduncles somewhat inflated, but not more than one-third the diameter of fruit heads. Varies as much in leaf cutting and hispidity as last, but leaves never bright green, usually thick. I. Europa Flats! Above Alameda! North Front! Sentry Fence! II.! III. i. Near Linea Cemetery! (with pinnatifid leaves). Near Pinar de los Bigotes!

H. tubæformis Ten. (*H. cretica* var. *subacaulis* DC.). Similar places; very common; 3–5. Perhaps a variety of last, with peduncles greatly inflated, at least half diameter of fruiting heads. III. ii. Path near Reina Cristina Hotel, and elsewhere!

H. arenaria DC. In deep sand; frequent; 4–6. Very like a *Hypochæris*; anthodes much larger than in last three, and pappus rays always numerous. I. West side and sea sands near Old Mole, *K.*; not there now, I think. East side, *Boiss.* Sentry Fence! II.! III. i. Linea! Carteian Hills! ii. Palmones Playazo! Sandy Bay! iii. Palmones Sands!

[*H. pygmæa* Wk. I gathered a few specimens of a very small species near the road and Spanish Lines on eastern side of Neutral Ground, which may belong to this species, but they were in flower only, and I was unable to find them again to get fruit.]

†*Hyoseris scabra* L. (*H. microcephala* Cass.). Dry rocky and gravelly places; rather rare; 3–5. I. Buena Vista to Europa Flats! III. i. Slopes of San Roque, *D.*

H. radiata L. Similar places; abundant on Rock, rather common in Spain. I.! III. i. About San Roque! Queen of Spain's Chair! Cork Woods! ii. and iii.!

†*Rhagadiolus stellatus* DC. Grassy fields or bushy places in light soil; occasional; 4–5. The type has lower leaves oblong-lanceolate, dentate, not lobed. I. *K.* III. i. Foot of San Roque, *K.*, *D.* Carteian Hills! Alcadeza! Almoraima! ii. Algeciras Station! M. de la Torre!

Var. *edulis* DC. has leaves lyrate pinnatifid, the terminal lobe large, orbicular. I think as common as type and mixed with it!

Thrincia hispida Roth. Grassy and rough places; both varieties abundant; 1–12, chiefly 4–5.

Var. *minor* Boiss. is smaller in all parts, scapes 1–3 in. I.! II.! III.!

Var. *major* Boiss. is more hirsute, scapes 3–12 in., thickened at apex, heads twice the size. I.! II.! III.!

T. tuberosa DC. Open grassy fields; common; 10–4. All achenes with beak about half their length. III. i. and ii.!

T. maroccana Pers. Similar places; rare? 5. Annual, outer achenes shortly, inner very longly beaked, but this is variable. It may be only a first year's flowering of last. I. *Frere*. III. i. Near San Roque, *Boiss.*

†*Leontodon hispanicus* Mer. var. *psilocalyx* Wk. Very hispid, all achenes with pappus, not inner only. III. ii. Sandy hills near Algeciras, *Winkl.*

Helminthia echioides Gaertn. Hedges and bushy places; occasional; 5–9. Outer phyllaries cordate, as long as lanceolate inner. I. Scud Hill, *Dumbreck*. Gibraltar, *K.* III. i. Abundantly by San Roque Road, *K.* ii. Algeciras, *Rev.*

H. comosa Boiss. Similar places; rather common; 5–6. Stem and leaves with much larger and more numerous asperities on tubercles, outer phyllaries ovate or lanceolate, one-third as long as inner. II.! III.! A dwarf form is abundant on Carnero Hills!

Urospermum picroides Desf. Dry bushy, grassy and sandy places; common; 3–5. I.! II.! III.!

Picris hieracioides L. Stony and rocky places; rare; 6–7. III. i. Roadsides near San Roque, *D.*

Podospermum calcitrapifolium DC. Grassy places and by ditches; occasional or frequent; 4–5. III. i. Carteian Hills! San Roque! Foot of Chair! iii. Salt Pans! Near Palmones Village, often in a very dwarf form!

Scorzonera hispanica L. var. *latifolia* Koch. Cornfields; rare? 4–6. Phyllaries very unequal, leaves broad, III. iii. Between San Roque and Algeciras, *Winkl.*

†Var. *glastifolia* Wallr. has leaves about 2 lines broad, and is the only form I have seen. It is frequent. III. i. and ii.!

Tragopogon porrifolius L.? Sandy and grassy places; rare or next mistaken for it? 4–5. Flowers purple, achenes abruptly narrowed into a long beak, pappus of all achenes plumose. I. *Brouss.* An escape?

†Var. *australis* P. L. Leaves undulate, florets much shorter than phyllaries, achenes gradually attenuate into a beak shorter than fruit. III. i. Near San Roque, *D.*, who does not record next; a possible error?

Geropogon glaber L. Cornfields and grassy places; locally frequent; 4–5. Flowers pale purple, pappus of outer achenes of 5 short pales, not of hairs. III. i. Hills over San Roque Station! ii. Railside near Algeciras! Towards Sandy Bay!

Hypochœris radicata L. Sandy places; frequent or common; 4–6. Tall, often 2 ft. high, scapes elongate, erectly branched, all achenes with beak longer than fruit. III.!

Var. *heterocarpa* Mor. has outer achenes not beaked. III. ii. About Algeciras, *Rev.*

H. Salzmanniana Coss. Sand-dunes; very common; 2–6. Annual, flowers as large as last, phyllaries hispid or glabrous, leaves usually hispid-ciliate. Sometimes regarded as a variety of *H. glabra*, but very distinct. II.! III.!

†*H. glabra* L. Sandy fields; frequent? 2–6. Annual, glabrous, flowers small, closing at noon. Varies in length of beak of outer and inner achenes, but no varieties recorded in our limits. III. i. and ii.!

[*Seriola ætnensis* L. A specimen from Willkomm at Kew labelled "Malaga and Gibraltar" was probably gathered near the former place. Kelaart records it from the neighbourhood of Gibraltar.]

Taraxacum officinale Wigg. (*T. Dens-leonis* Desf.). Grassy places and roadsides; rare; 5–6. Kelaart records var. *lævigatum* DC., with runcinate pinnatifid leaves, and var. *obovatum* DC., with them entire, from the Rock. There is little doubt that he mistook *Hyoseris radiata* for it. [I. *K.*] III. ii. Algeciras, *Rev.*

Lactuca tenerrima Pourr. Rocks and old walls; locally very common; 6–7. Usually as †var. *scabra* Boiss., with scabrid white hairs, but the type occurs. I.! III. ii. Walls at Algeciras and El Cobre!

L. saligna L. Ditches and banks; rare; 7–9. Stem leaves narrow, entire, sagittate, the radical often sinuate-lobed. III. i. Railway about San Roque Station! ii. Railside near Algeciras!? iii. Salt Pans!? Guadacorte Marsh!? Leaves only seen in last three stations, which may have belonged to *L. Scariola* L., a common species in the province.

Picridium tingitanum Desf. Sands by sea, and rocky places; frequent? 4–6. Usually short, phyllaries broadly ovate, squarrose, the outer acuminate, conspicuously broadly scarious, white-edged. I. Clefts of rocks on west slopes, *K.*, *D.*, *Rev.* II. *ib.* III. ii. Algeciras, *Rev.*

P. intermedium Schultz. Sandy and gravelly places; common; 2–5. Annual, slender, leaves thin, green. I.! III.!

P. vulgare Desf. var. *crassifolium* Wk. Rocks and sandy places near sea; rather frequent; 1–12, chiefly 3–5. Perennial, phyllaries lanceolate, outer not squarrose, nor broadly winged. The type, which is not recorded, has the habit of *P. intermedium*, the var. is dense and compact, with thick fleshy leaves. I.! II.! III. i. San Roque, *Colm.* ii. Palmones Playazo! Sandy Bay! Carnero Point!

†Var. *maritimum* Boiss. Has all leaves pinnatipartite, with narrow segments. I. East and south slopes, *Boiss.*, *K.*, *D.* III. ii. Palmones Playazo!

Sonchus tenerrimus L. Rocks, bushy places, and old walls; very common; 1–12, chiefly 2–6. Varies greatly in leaf cutting and size of flower.

†Var. *lævigatus* Lge. (var. *annuus* Lge. ?). Annual, peduncles glabrous, leaf segments narrow, acute. I. *D.* III. ii. Waterfall Valley!

Var. *glandulosus* Lge. Annual, peduncles densely glandular, leaf segments broadly oval, obtuse. I. *Wk.* III. ii. Near Algeciras, *Winkl.*

†Var. *spinulosus* Lge. As last, but leaf segments acute or acuminate, much spinulose dentate. III. i. Alcadeza Crags!

Var. *perennis* Lge. Perennial, peduncles and heads glabrous or glandular, leaves various. Much the commonest form. I.! III. i. Carteia! Alcadeza! Malaga Gardens! ii. from Palmones Playazo to Carnero Point!

S. oleraceus L. Roadsides, grassy places and by streams; frequent; 1–12. Leaf auricles acute, deflexed or spreading, achenes rugose. I.! II.! III. i. and ii.!

S. asper Vill. Similar places; less frequent; 3–9. Auricles deflexed and rounded, achenes ribbed, not rugose. I. Rare, *K.* II.! III.!

S. glaucescens Jord. Sandy cultivated fields; rare; 3–5. Biennial, leaves thick, heads twice the size of last, achenes more or less winged, retrorsely ciliate. III. ii. Near Algeciras, *Winkl.*

Ætheorrhiza bulbosa Cass. In deep sand, occasionally stony places; common; 3–5. I. Near O'Hara's! Near Willis's! Catalan Bay! II.! III.!

†*Barkhausia fœtida* DC. Old walls and waste places; rare? 6. Like next, but outer achenes more shortly beaked, flowers subsolitary, nodding in bud, peduncles thickened at top. I. South and west slopes, *K.*, *D.*

B. taraxacifolia Thuill. Fields and rough bushy places; abundant; 12–5. Most variable, either cæspitose and spreading, or erect, with solitary stems branched at top. I. Chiefly lower north and west slopes! III.!

†Var. *Haenseleri* Boiss. Glabrescent, leaves obtuse, dentate, not lobed. I.! Rare?

Crepis tingitana Ball. Woods and heathy slopes; locally frequent; 3–5. Like a *Hieracium*, little branched, leaves few, large, basal subtruncate, cauline narrowed below. III. i. Cork Woods! Majarambout Crags! ii. Mountains!

C. virens L. Dry sandy places, occasional; 3–5. Unlike any British form, but agreeing closely with the eastern *C. parviflora* Desf. Erect, corymbosely branched, leaves mostly radical, dentate, flowers rather small, pale yellow, often reddish on back, fading to orange. I. Above the Library! North Front! II.! III.! Chiefly about Palmones and Guadacorte!

Var. *runcinata* Bischff. has basal leaves runcinate pinnatifid. III. i. Grassy fields at San Roque, *D.*

†*C. corymbosa* Ten. Similar places? rare; 6. Annual, more or less pubescent, 1 ft. or more high, leaves spathulate, runcinate. Anthodes 4 lines long, on long slender peduncles in lax paniculate cymes, achenes not beaked. III. ii. S. de Palma. *Rev.*

†Var. *bœtica* Wk. has stems more pubescent, leaves sinuate dentate, heads smaller, and phyllaries glabrous inside. III. ii. With type, *Rev.*

Andryala integrifolia L. Dry rocky or bushy places; common; 5–7. Biennial, canescent and softly tomentose, receptacle with very long setæ, pappus as long as phyllaries. The type (var. *corymbosa* Wk., *A. parviflora* var. *latifolia* Boiss.) is much branched at top, heads 4 lines, in a compact corymb, leaves entire or only dentate, often undulate. I.! II.! III. i. and ii.!

Var. *sinuata* Wk. Leaves narrow, more or less sinuate-dentate, or runcinate pinnatifid, cymes laxer, heads smaller. I. Common, *K.*, *D.*, *Boiss.* III. ii. Algeciras, *Rev.*

A. arenaria B. & R. Sandy places; frequent, locally common; 3–5. Annual, much more softly tomentose, receptacle with short setuli, pappus shorter than phyllaries, corymb small, dense, flowers orange, red on back. II. *K.*, *Boiss.* III. i. Cork Woods! Pine Wood Plains! Foot of San Roque, *K.*, *Boiss.*

A. laxiflora DC. Rocky slopes; rare; 6. Like last but anthodes 5 lines, on longish peduncles in a lax corymb, flowers pale yellow. I. *D.*

Xanthium macrocarpum DC. Sandy, rather damp places; locally abundant; 7–9. Like *X. italicum* but with much stouter fruit spines, apical beak incurved. II.! III. i. Punta Mala! ii. Palmones Playazo!

X. spinosum L. Roadsides and sandy waste places; occasional; 4–9. II.! III. i. Campamento and roadside to San Roque! Lajo banks! Near San Roque Station! ii. About Algeciras! iii. Palmones Village!

X. italicum Moretti. Rather damp sandy places and by rivers; rather rare? 7–9. II.!? Only detached fruit seen. III. ii. Palmones Playazo!

CAMPANULACEÆ.

Laurentia Michelii DC. Stream beds and under damp rocks; rather frequent; 4–6. III. i. Queen of Spain's Chair, chiefly east slopes! ii. Mountains!

Lobelia urens L. Streams and damp hollows; frequent in mountains, occasional elsewhere; 4–6.

Var. *longibracteata* P. L. has bracts longer than calyx, sometimes than corolla, and longer calyx lobes. It is said to be the common form, but the type certainly occurs frequently, and I have not distinguished them. III. i. Hedges at Campamento in profusion, *K.* Queen of Spain's Chair! Alcadeza! Cork Woods! ii. Mountains! iii. Palmones Sands!

†*Jasione montana* L. Sandy and heathy places; frequent; 4–6. Varies greatly in habit, duration, and length of calyx segments and pedicels. The type is not recorded.

Var. *echinata* Wk. (var. *dentata* DC.). Biennial, stout, erect, 12–18 in. The usual mountain and wood form. I. *Boiss.* III. i. Queen of Spain's Chair! San Roque, *B. & R.* Cork Woods! ii. S. de Palma, *Rev.* El Cobre!

Var. *bracteosa* Wk. (var. *littoralis* Boiss., *J. blepharodon* B. & R.). Shorter, more cæspitose, with different calyx segments. The form of sandy open spots. I. Catalan Bay! Mediterranean Steps, *K.* III. i. San Roque, *Boiss, D.* My 1306, a very dwarf cæspitose hispid form, from near La Tunares, probably belongs here.

†*J. rosularis* B. & R. Heathy hills; rare; 4–6. Perennial, basal leaves rosulate, heads large, calyx segments lanceolate, rigid, longly pungent acuminate, thrice as long as tube. The station cited is the classic one, but I have referred all I have seen there to *J. montana* var. *echinata.* III. i. Queen of Spain's Chair, *B. & R.*, *D.*

Campanula mollis L. Rocks; locally frequent; 5–7. I.!

†Var. *microphylla* DC. has smaller ovate acute subdentate cauline leaves, and is mixed with the type. I. *Brouss.*

C. dichotoma L. †var. *brachiata* A. DC. Dry sandy banks; rare; 5–6. Annual, erect, calycine appendages narrow, as long as tube, but they vary in *C. mollis*, and dried specimens are not always easily distinguished. I. *Gouan*! and by an unknown collector, both labelled *C. mollis*, but placed in this cover at Kew. III. i. Escarpments of San Roque, *D.*

C. Erinus L. Rocks, old walls and dry stony places; common; 4–5. I.! III. i. Cachon! First Venta! ii. On railway! Waterfall! El Cobre! iii. Palmones!

C. Rapunculus L. Bushy places in woods and hills; common; 4–6. Varies in habit, the strict forms usually more hispid than the diffusely branched ones, but the varieties are not clearly distinguished. I. Near Bruce's Farm! III.!

C. patula L.? Woods and bushy places; rare or error? 5-7. Biennial, stems rather stout, strict, basal leaves rosulate, corolla reddish violet, lobes rather long and narrow, widely spreading. I. *Brouss.*! a poor specimen, which I think belongs to the next species.

C. Lœflingii Brot. (*C. erinoides* L.). Sandy bushy places, occasionally in mountains; common, often abundant; 4–6. Annual, slender, much branched from base, without a rosette, corolla smaller, less open, black at the base, not white as described. Its habit and appearance are very different from *C. patula.* I. Not very common, chiefly on higher parts, *K.* III.! My 2032, in fields towards S. Lorca, is shorter and more cæspitose, the corolla without a dark base, and calyx segments much broader. I suspect it belongs here.

†Var. *filiformis* Lge. Very slender, elongate, retrorsely scabrid, branches elongate, calyx segments scabrid, very longly setaceous. III. ii. Sands near Algeciras, *Kusinsky.*

Trachelium cæruleum L. Rather damp walls and banks; occasional; 5-6. III. i. Lajo near upper ford, and above First Pine Wood! Railside beyond Almoraima! ii. By R. Lobo! Roadside at Puente de los Pastores! Waterfall Valley!

ERICACEÆ.

Arbutus Unedo L. Woods and mountain slopes; locally frequent; 10–12. III. i. Cork Woods! ii. Mountains to highest ridge!

Rhododendron bæticum B. & R. Mountain valleys; locally common; 4–6. III. [i. Castellar, beyond our limits, *K.*] ii. Mountains to highest ridge!

Erica ciliaris L. Heathy places in mountains and woods; occasional; 7–10. III. i. Queen of Spain's Chair! ii. Mountains!

E. arborea L. Similar places; much commoner; 3–4. III. i. Cork Woods! ii. Mountains!

E. scoparia L. Similar places; very common; 4–5. III. i. Queen of Spain's Chair! Cork Woods! Alcadeza Crags! ii. Mountains!

E. australis L. Similar places; common; 12–1. III. i. and ii. Same stations, also Palmones Pinar!

E. umbellata L. Similar places; occasional; 2–6. III. i. Cork Woods, especially near Second Pine Wood! Alcadeza Crags and Plains! ii. Mountains!

Var. *subcampanulata* DC. Throat of corolla more open, stamens shorter. III. ii. S. de Saladillo, *P. L.*

†Var. *major* Coss. Corolla nearly twice the size, 2½–3 lines long, anthers larger but less exserted. III. i. Near San Roque, *Wk.* ii. S. de Palma, *Rev.*

†Var. *anandra* Lge. Corolla larger than type, cylindrical, anthers none. III. ii. S. de Luna near Los Barrios, *Nilss.*

E. mediterranea L. Similar places; rare; 1–3. III. ii. Hills behind Algeciras, *Frere.*

Calluna vulgaris Salisb. Similar places; abundant; 7–13. III. i. and ii.!

†Var. *depressa* W.-Dod. in Journ. Bot., 1914, p. 13. Prostrate, stems tortuous, intricate. III. i. All over Bonel's Farm!

OLEACEÆ.

Jasminum fruticans L. Rocky bushy places; very common; 3–5. I.!

Olea europæa L. Mountain and hill slopes; common; 5–6. [I. A few trees cultivated in Kelaart's time.]

Var. *oleaster* DC. The wild form, with much smaller fruit. I.! III.!

Phillyrea latifolia L. Woods; occasional, or locally frequent; 2–4. Described as a tree, 18–24 ft. high; I have only seen it as a bush, 8–10 ft., often much less; leaves rather deeply and very acutely serrate, or almost entire on the same bush, fruit globose, umbilicate at apex. III. i. Cork Woods near Second Venta! ii. Waterfall Valley!

†Var. *obliqua* Ait., with elliptical lanceolate leaves, teeth almost obsolete. III. ii. With type in S. de Palma, *Wk.*

P. media L. Similar places; rare? 12–1. Very like last, but a rounder fuller bush, with finely toothed leaves, about twice as long as broad, fruit globose, abruptly mucronate, not umbilicate. I. Old Man's Garden! Near Corsican's Post! Levant! I think not common all over the Rock, as Kelaart and Dautez report. III. ii. Recorded in my notes, but authority mislaid.

P. angustifolia L. Similar places; common; 1–4. Leaves almost linear. III. i. Malaga Gardens! Alcadeza Crags! Cork Woods! ii. Palmones Playazo, a broad-leaved form! Mountains! iii. Palmones Sands!

Fraxinus angustifolia Vahl. Woods and hedges; rather frequent; 1–2. [I. Engineer Road and about Alameda, not native?] III. i. Alcadeza! Railway near Guadarranque River! Cork Wood Sotos! ii. M. de la Torre! Near Palmones railway bridge! iii. Guadacorte!

APOCYNACEÆ.

Vinca media Hoffm. & Link. Banks and bushy places; abundant; 12–4. I.! III.! With white flowers near Levant, below Signal Station, and railside near Long Stables!

Nerium Oleander L. By streams and rivers; very common; 5–9. [I. Native, *K.*] I think this doubtful. III.!

ASCLEPIADACEÆ.

*†*Gomphocarpus fruticosus* R. Br. Among bushes; rare; 5–6. III. ii. At El Cobre, quite naturalized!

GENTIANACEÆ.

Chlora perfoliata L. Hill slopes and banks; occasional; 5–8. Cauline leaves connate for their whole width, calyx divided to base, segments linear-subulate, shorter than corolla. I. Near Signal Station Road! Catalan Bay, *Hurst*! III. i. Upper Lajo and Alcadeza! ii. El Cobre, both very slender forms! Carnero Hills! iii. Palmones!

Var. *sessilifolia* Griseb. More slender, shorter, leaves longer, more acute, scarcely connate except uppermost. Connects with next through its var. *lanceolata* Koch. III. i. Woody places about San Roque, *D.* ii. Algeciras, *Rev.*

C. imperfoliata L. f. Similar places, partial to damp; occasional; 5–6. Lower and middle leaves not connate, flowers longly peduncled, calyx segments broadly linear-lanceolate, connate at base, longer than corolla. II.! III. i. Bonel's Farm! iii. Palmones Sands! Guadacorte!

Cicendia filiformis Delarb. Rather damp sandy places; locally frequent; 4–6. III. I. Bonel's Farm and lower east slopes of Chair! ii. Near Palmones Pinar! Rare in mountains!

†*C. pusilla* Griseb. Similar places; rare; 5–7. III. i. Near San Roque, *Ball*! ii. S. de Palma in Los Barrios district, *Rev.*

Erythræa maritima Pers. Dry grassy and sandy places; rather frequent; 4–6. Flowers yellow. III. i. and ii.! Not seen north of San Roque, but occurs in Algeciras mountains!

E. spicata Pers. †var. *glauca* Rev. Salt marshes; locally frequent; 6–9. III. iii. Salt Pans! Guadacorte marshes!

E. ramosissima Pers. (*E. pulchella* Hornem.). Sandy banks and grassy places, partial to damp; locally frequent; 4–8. Varies much in habit. Starved forms from Guadarranque marshes may be f. *gracilis* Daut. & Deb. III. i. Between Neutral Ground and Guadarranque River, *D.* ii. Hills round Algeciras! Carnero Hills! iii. Palmones Sands and Marshes!

E. latifolia Sm. var. *tenuiflora* Hoffm. & Link. Similar places; rare; 4–8. Resembles last, but much taller, much branched above only, with subcorymbose inflorescence, leaves broader. III. ii. Saline marshes and sands at Algeciras, *Rev.* iii. Guadacorte Marshes!

†*E. Barrelieri* L. Dry or rocky hills; rare; 6–8. Distinct from all in its long linear-subulate leaves, and large pedicelled flowers. III. i. S. Carbonera, *D.*

E. Centaurium Pers. Dry rough and bushy places, and woods; occasional or frequent; 5–7. Flowers sessile, medium-sized, always in a flat-topped more or less dense corymb. I. A large-flowered form from east slopes below Middle Hill may be the true var. *grandiflora* Pers. (non Biv.), and a dwarf form with a rosette of very broad leaves, from the foot of the precipice below, may be the same! Type not seen. III. i. and ii.! A white or very pale pink-flowered form replaces the normal about El Cobre!

Var. *suffruticosa* Griseb. has stem subwoody at base, and shorter corolla lobes, but most specimens I have seen so labelled are quite herbaceous at the base. I. Not frequent, *K.* III. i. In great abundance on road to Cork Woods in company with *E. major*, K. No *Erythræa* is abundant there now, but type *E. Centaurium* is fairly frequent. San Roque, *Boiss.* iii. Hills near Los Barrios, *P. L.* Perhaps outside our limits.

E. grandiflora Biv. (*E. Boissieri* Wk., *E. sanguinea* Mab.?, *E. Centaurium* var. *grandiflora* Pers.?). Similar places and by ditches; frequent in Spain, rather rare on Rock; 5–7. Flowers very large, in a lax cyme, not a compact corymb. I.! III.!

†*E. acutiflora* Schott. Similar places; rare; 6. Short, leaves very acute, corolla lobes narrow, acute. The description hardly differentiates it from *E. tenuiflora.* III. i. By streams of San Roque, *Schott.* ii. Damp places at Algeciras, *Rev.*

[BIGNONIACEÆ.]

[*Catalpa syringæflora* Sims is only cultivated.]

CONVOLVULACEÆ.

Convolvulus althæoides L. Dry fields, &c., abundant; 4–6. I! II.! III.!

C. arvensis L. Fields and sandy places; very common; 5–8. I.! III.!

†Var. *linearifolius* Choisy, with elongate broadly linear leaves, is alone recorded by Debeaux, but the type is much more frequent. I. *K.*

†*C. siculus* L. Dry bushy and stony places; frequent on the Rock; 3–5. I.! III. i. Queen of Spain's Chair; rare!

†*C. undulatus* Cav. Cultivated and sandy fields; rare; 4–6. Annual, leaves broadly oblong, flowers subsessile, axillary. III. i. Foot of San Roque, *Wk.*

C. tricolor L. Fields; common, sometimes abundant; 4–6. Flowers bright blue, with white tube and yellow throat, sepals hirsute, in a cylindrical tube at base, spreading above, occasionally spathulate. A very pale-flowered form occurs, quite distinct from next. I. Rare, near Naval Hospital, *K.* II.! III.!

C. meonanthus Hoffm. & Link. Similar places, also on rough hills; common, often a field full; 4–5. Flowers smaller, pale lilac, not blue, sepals subglabrous, in a conical tube from base, not spreading above. The two species seldom grow together. III. i. Much commoner than last! ii. and iii.!

Calystegia sepium R. Br. Hedges and woods, perhaps often planted; frequent; 5–7. [I. Hedges at St. Bernard's, but not native on Rock!] III.!

Var. *sylvestris* Wk., flowers much larger, bracts very large and overlapping. I believe frequent, but have not distinguished it. III. ii. Damp places by R. Ancho near Algeciras, *P. L.* El Cobre!?

C. Soldanella R. Br. Sand-dunes by sea; local; 4–6. III. ii. and iii. About Palmones, on both sides of River!

†*Cuscuta Epithymum L.* On many low growing plants; rather frequent; 5–7. The type has corolla tube much longer than the very broad short calyx segments, and does not, I believe, occur.

†Var. *angustata* Engelm. has a very short corolla tube, the lobes and calyx segments triangular, longly acuminate. I. Upper and middle slopes! III. i. Queen of Spain's Chair! Carteian Hills! Alcadeza! ii. By Algeciras Cemetery! Carnero Hills! Common in mountains!

Var. *Kotschyi* Engelm., differs from var. *angustata* only in smaller heads of closely sessile flowers, and stouter stem. I. On *Brachypodium pinnatum*, D.

†Var. *obtusata* Engelm. has few-flowered glomerules, pedicels longer than calyx, and broadly ovate calyx and corolla lobes. III. ii. S. de Luna in Los Barrios district, *Nilss.*

BORAGINACEÆ.

Heliotropium europæum L. Dry cultivated fields, roadsides, and waste places; frequent; 6–11. Var. *tenuiflora* Guss. is the commoner form in the province, and may be ours. I. Lighthouse! By Kennels! Above Devil's Gap! II. Forms large beds, *K.* I have not seen it there at all. III. i. By Francia's Farm! Near Bonel's Farm! Rail near San Roque Station! ii. Algeciras Station, &c.! iii. Palmones Village!

H. supinum L. Similar places, often on dried mud; rare? flowers too late for my observations of its distribution; 6–7. III. i. In San Roque! Roadside beyond Francia's Farm! iii. About Los Barrios Station!

Cerinthe major L. Roadsides and fallow fields; abundant; 2–5. The type has yellowish-green bracts, and either yellowish or purple flowers, and is the sylvan form. I. Above Ince's! Sunnyside Steps! North Front, *Frere.* II.! III. i. Cork Woods, &c.! ii. and iii. rare!

Var. *purpurascens* Boiss. Bracts as well as flowers dark purple; much commoner than type in open ground. I. *K.* II. *K.* III.!

Anchusa calcarea Boiss. Sandy fields; rare; 3–6. Flowers small, violet purple, calyx shortly 5-fid. III. i. At Foot of San Roque, *Boiss, Wk., D.*

Var. *scaberrima* Boiss. is much more setose. III. i. With type, *ib.*

A. italica Retz. Fields; common; 4–5. I. Mediterranean Road, but more abundant on lower parts, *K.* A specimen in herb.

Balestrino, labelled *Lithospermum purpureo-cœruleum*, probably came from the Rock, where it does not now, I think, occur. III.!

Borago officinalis L. Roadsides, fields, and waste places; very common, sometimes in masses; 2–5. Occasionally with white flowers. I.! II.! III.!

Echium Pomponium L. (*E. glomeratum* Boiss.). Rocky places; rare; 5–6. The largest of our species, racemes many, lateral, densely covered with yellowish flowers. *E. flavum* Desf. may not be distinct; Lemann's specimen is so labelled. My own closely resembles Jacquin's figure of *E. altissimum* (*E. italicum* L.), but that has usually a much laxer panicle. I. Mediterranean Steps!

E. pustulatum Sibth. & Sm. Chiefly sand-dunes; rather frequent; 5–6. Very hispid, leaves narrow, panicle often cylindrical, but equally often much branched, corolla usually reddish purple. I. Rocky places on south and west slopes, *Wk.*, *K.*, *D.* III. i. Towards Pedrera! Near Tunares! Punta Mala! Cork Wood Crags, &c.! ii. Palmones Playazo! iii. Palmones Village and Sands!

[*E. italicum* L., resembling *E. Pomponium*, but usually much more branched, and with pale bluish flowers, has been found by Perez Lara at Boca de Leon, just beyond our limits.]

†*E. maritimum* Willd. Sandy ground; rare; 3–6. Distinguished from all others but *E. calycinum* by its included stamens, and from that by its larger deeper purple flowers. I. Devil's Gap to Queen's Gate! III. i. Punta Mala! Sea sand at foot of S. Carbonera and of San Roque, *Wk.*

E. plantagineum L. Sandy fields; abundant; 4–6. Leaves almost silky, stem little asperous, flowers very large. Varies greatly in habit, either with a single, erect, simple or branched stem, radical leaves withered by time of flowering, or, more commonly, with a radical rosette of very broad leaves, with several prostrate lateral and one central erect stem. I. Rare upper, more frequent lower slopes! North Front! II.! III.!

E. creticum L. Rocky slopes, very common on Rock; 3–5. Like the erect form of last, but much more asperous, especially leaves. I.! II. *K.*, *D.* III. i. Sand-dunes at San Roque, *Wk.* Alcadeza!

E. calycinum Viv. (*E. parviflorum* Moench.). Roadsides and stony places; common; 2–4. Flowers small, pale blue, stamens all included. I. General, but chiefly south!

[*Lithospermum purpureo-cœruleum* Willd. was communicated to Kelaart, certainly in error. A specimen of *Anchusa italica* is so labelled in herb. Balestrino.]

L. fruticosum L. Heathy places in woods and mountains; frequent; 1–6. Perez Lara says our variety is his *prostratum*, but the characters are very indefinite, and Debeaux only admits var. *erectum* Coss. I. *Frere.* III. i. Queen of Spain's Chair! Pine Wood Plains! Cork Woods! ii. Mountains!

[*L. officinale* L. Recorded from the Rock by Kelaart, either in error or as a casual.]

L. arvense L. Fields and roadsides; rare; 3–5. III. i. Linea! Near San Roque! ii. Algeciras Station!

L. apulum Vahl. Dry hills; frequent; 3–5. III. i. Carteian Hills! Campamento Common!

Myosotis repens Don. (*M. palustris* Roth. var. *bætica* P. L.?). Marshes and streams; locally common; 4–6. Calyx tube conical, deeply cleft, teeth much longer than broad, flowers rather large. III. i. Near top of Chair! ii. Mountains! iii. Guadacorte!

†*M. lingulata* Lehm. (*M. cæspitosa* Schultz). Similar places; rare; 4–6. No aerial creeping stolons, leaves narrower, flowers smaller, corolla limb not wider than length of tube. III. ii. Hills near San Bernabe!

†*M. sicula* Guss. Similar places; rare; 5–6. Annual, pedicels ebracteate, scarcely longer than calyx, usually ascending in fruit. III. iii. Boggy meadows near Palmones, *Winkl.*

†*M. maritima* Hochst.? Marshes near sea; rare; 5. Perennial, base of stem woody, hairs on tubercles, flowers very large and pale. An Azorean species. III. ii. Near Algeciras, *Rev.*

M. hispida Schl. (*M. collina* Reichb.). Sandy places, or in woods; frequent; 3–5. III. i. Cork Woods! ii. Palmones Playazo and Pinar! iii. Palmones Sands!

M. versicolor Pers. Similar or more grassy places; occasional; 3–5. III. i. Andalucian racecourse. Pinar de los Bigotes! Cork Woods! ii. Algeciras Golf Links! Palmones Playazo and Pinar! Near M. de la Torre! iii. Palmones Sands!

M. intermedia Link. (*M. arvensis* Hill). Sandy fields; rare; 3–5. III. [i. Near Gibraltar, *K.* Not "at Gibraltar," as Debeaux says.] ii. Near Algeciras, Clem.

[*M. sylvatica* Hoffm. Debeaux credits Kelaart with this from near San Roque, but Kelaart only reports it from the neighbourhood of Gibraltar, probably outside our limits.]

Cynoglossum cheirifolium L. Rocky and stony places; occasional; 2–4. The corolla is described as rosy, fading to violet or blue, but the limb is permanently cream-coloured, the tube and throat processes deep maroon. I. Jews' Cemetery! Ince's! Willis's! III. i. San Roque, *D.* ii. Algeciras, *D.*

C. clandestinum Desf. Dry hills and sandy places; frequent; 2–4. III.!

C. pictum Ait. Similar places; frequent; 3–5. I. In great abundance on middle parts, *K.* I have only seen a single specimen near Green's Lodge! III.!

Omphalodes linifolia Pourr. Dry bushy places; locally frequent; 5. III. i. Cork Wood Crags! Alcadeza Crags!

[*Symphytum tuberosum* L. was communicated to Kelaart from the Rock. Error or casual?]

SOLANACEÆ.

Solanum nigrum L. Roadsides and waste places; rare; 1–12. The black berries are the only constant feature; leaf lobing, hairiness, and size and colour of flowers vary greatly. I. Sandpits! North Front! III. i. Cork Woods! ii. El Cobre! Near M. de la Torre!

Var. *miniatum* Mert. & Koch. Much commoner. I.! III.! Rare in ii.

Var. *suffruticosum* Moris is 3–5 ft. high, woody at base. A common var. in the province, but rare with us. I. Devil's Gap and elsewhere!

S. villosum Lamk. Similar places; occasional? 1–12. Softly pubescent, musk-scented, flowers twice as large, fruit orange yellow. I have not seen fruit, and believe my gatherings are villous form of *S. nigrum*. I. Common, *K.*, *D.* Above Engineer Road!? III. i. Almendral!? ii. Algeciras Station!? El Cobre!? with small violet flowers.

S. sodomæum L. Waste sandy places, mostly near cottages; frequent; 2–11, but chiefly 4–9. I. On lower, rarely upper Rock! II.! III. i. Linea! Alcadeza! Rare in Cork Woods! ii. and iii.! On charcoal burnings in the mountains!

S. Dulcamara L. By streams and sotos; locally frequent; 6–8. III. i. By Lajo from First Pine Wood to Almendral! Arroyo Viejo! Cork Woods!

[*Lycium europæum* L. Hedges; rare, probably nowhere native; 3–5. Corolla narrowly funnel-shaped, pale purple. I. Devil's Gap! Below main road, near St. Bernard's! III. i. Near Francia's Farm!]

[*L. afrum* L. Corolla broadly funnel-shaped, dark brownish purple. Hedges of gardens in Gibraltar, *D.*]

Mandragora autumnalis Spreng. Fields and grassy places; common; 9–1. III. i. Carteian Hills! Arroyo Viejo! Almoraima! ii. Hills near Algeciras!

Datura Stramonium L. Waste sandy places, chiefly near buildings; occasional; 4–11. I. Sporadic, as on North Front! III. i. Near San Roque Station! Campamento! Above Almoraima! iii. Palmones Village!

†Var. *chalybea* Koch has stem, petioles and calyces violet, flowers bluish. I. In lower part of town, *D.*

[*D. Metel* L. with entire leaves has occurred as a casual near the Landport, *K.*, *Pourr.*]

[*D. arborea* L. is only cultivated.]

[*Hyoscyamus niger* L. has been found as a casual on Europa Flats, *Frere.*]

H. albus L. Waste places; type rare; 1–12. I. Near Monkey's Cave!

Var. *major* P. L. has throat and stamens blackish purple, and is the commoner. I. Europa Flats! Moorish Castle! Near slaughter houses! Mediterranean Road! III. i. Alcadeza Crags!

**Nicotiana glauca* Grah. is quite naturalised at Catalan Bay, Engineer Road, Dockyard, and at Puente Mayorga!

[*Cestrum Parqui* L'Hérit. is an occasional escape. A bush grows on Neutral Ground just beyond our lines, but may be destroyed by the new road!]

SCROPHULARIACEÆ.

Verbascum thapsiforme Schrad. Sandy ground; locally frequent; 4–6. I.? Leaves apparently of this species on slopes above Catalan Bay!? III. i. Cork Woods near Soto Gordo! ii. Palmones Playazo! iii. Palmones Village!

V. sinuatum L. Sandy banks and roadsides; frequent; 6–9. I.! II.! III.! With white flowers by railway near Guadacorte!

V. virgatum With. Similar places; rare; 5–6. III. i. By river above Almoraima! Lane to First Venta! Near San Roque, *Brouss.* iii. Palmones Village!

†*Scrophularia laxiflora* Lge. By streams and in woods; locally common; 3–5. Cymes very lax, much more so than in *S. aquatica*, flowers often pale, leaves not auricled. I. Near Willis's and catchment above! III. i. Cork Wood Sotos! ii. Mountain valleys!

[*S. lævigata* Vahl. A specimen from the Waterfall, my 884, exactly matches one from Ball, from same neighbourhood, labelled thus, but with a sign of doubt. It may be a form of last with leaves acutely doubly serrate. It is a Moroccan species.]

S. auriculata L. (*S. subverticillata* Moris). Damp places in open ground, not in woods; frequent; 3–9. Stout, cymes very dense, very dark-flowered, in a narrow raceme, flowers contiguous, bracts very broad, deeply lacerate, also sepals; leaves usually with one or two pairs of pinnæ at base. II.! III.!

†Var. *minor* Lge. (*L. aquatica* L.?) has probably been confounded with *S. laxiflora*, if it be really distinct. III. ii. Algeciras, *Rev.*

S. sambucifolia L. (*S. mellifera* Vahl.). Roadsides and ditches; rather common; 2–4. I. Sandpits! Above Alameda Parade! Engineer Road! III. i. and ii.!

S. canina L. Sandy ground and hedges; rather frequent; 3–5. The type (not recorded) has leaves much divided, with toothed lobes.

Var. *pinnatifida* Boiss. Leaves dentate or irregularly pinnatifid. III. i. Alcadeza Plains! Near Soto Gordo! Near Majarambout Woods! Cork Wood Crags!

Var. *frutescens* Boiss. More woody, leaves less cut. Var. *bætica* Boiss. hardly differs. I. *Schücht*! Rare, *K.* III. i. Frequent about San Roque, *K.* Alcadeza Plains! ii. Palmones Playazo! iii. Palmones Sands!

[*Anarrhinum laxiflorum* Boiss. was gathered by Reuter between San Roque and Grazalema, which is probably outside our limits. Debeaux cites it as "rocky hills of San Roque."]

A. bellidifolium Desf. Bushy hills; rare; 5–6. I. *Von Martius.* III. i. Sea-sand at foot of Fort S. Felipe, *D.* Pedrera, *D.* Alcadeza Crags!

[*Antirrhinum Linkianum* B. & R. is one of Gandoger's determinations from rocks in the neighbourhood of Gibraltar, *Dasoi.* Stem woody, leaves very broad, flowers bright purple. Probably an error.]

A. majus L. Rough bushy places; common on Rock, rare in

Spain; 3–6. I.! III. i. Alcadeza Crags! Valley near Long Stables! ii. Near Algeciras, *Née*.

Var. *ramosissimum* Wk. has many elongate flexuose branches; mixed with type and perhaps commoner. I.! III. i. Near San Roque, *D*.

†*A. tortuosum* Bosc. Similar places; frequent? 3–8. Much like last var., but wholly glabrous, leaves and sepals narrower. My only gathering for *A. majus* proved to be this. I. Both sides of Rock, *Reut.*, *Nilss*, &c. Below Mediterranean Road!

A. Orontium L. Fields and heathy places; common; 3–5. Very variable in leaves and flowers. I.! III.!

Var. *grandiflorum* Chav. has broad leaves and large flowers, often much branched. Common in Spain, rare on Rock. I.! III.!

†Var. *parviflorum* Lge. has flowers scarcely longer than calyx. III. i. San Roque, *D*.

Chænorrhinum villosum Lge. Rocks; locally frequent; 5–6. I.! III. i. Alcadeza Crags!

Var. *pusillum* Boiss. has very small leaves. I. *Winkl.*!

**Linaria Cymbalaria* L. On walls; occasional, but very doubtfully native, about the town and at San Roque!

L. cirrhosa Willd. Banks and rough places; rare; 5–7. Leaves narrow, sagittate, pedicels long, slender. Debeaux's notes after this species (Fl. p. 148), refer to *L. lanigera*, and possibly his San Roque stations refer to the latter also. I. *Brouss.*! III. i. About San Roque, *Brouss.*, *Pourr.* S. Carbonera, *Nilss.*

L. spuria Mill. Similar places; rare; 6–9. Calyx segments broadly oval, subcordate. III. ii. Near Algeciras, *Rev.*

Var. *racemigera* Lge. has very short pedicels and very small calyx segments. Perez Lara thinks it is synonymous with next. III. ii. Algeciras, *Rev.*

L. lanigera Desf. Similar places; rather frequent; 6–10. Very near last, but calyx segments narrow lanceolate. I. Abundant near messroom of South Pavilion, *K.*, herb. Balestrino!; not there now, I think. Behind the Mount, *K*. II.! III. i. and ii.! seldom seen by me in flower, but I think frequent.

L. triphylla Mill. Cultivated fields; rare; 3–5. Annual, leaves large and broad, flowers whitish or yellowish, variegated with lilac. I. *Brouss.*! III. i. At foot of San Roque, *D*.

[*L. Clementei* Haens. a perennial, 3 ft. high, flowers violet with yellow palate, has been reported from Gibraltar by Dasoi.]

L. viscosa Dum. Sandy ground; common; 2–6. Tall, with large yellow flowers in a compact raceme, scarcely longer in fruit. Often misnamed *L. spartea* L., which has much longer pedicels in a lax raceme. I. *Lem.*!? I think this, but fruiting raceme elongate. III. i. and ii.! In profusion on mountains after a fire!

L. pedunculata Spreng. Sand-dunes; locally plentiful; 3–5. I.! II.! III.! From Catalan Bay to Sandy Bay beyond Algeciras! Flowers purple or yellow.

L. amethystea Hoffm. & Link. Sandy and gravelly places; locally common; 2–5. Flowers violet. III. i. Cork Wood and Alcadeza Crags!

Var. *albiflora* Boiss. has petals white, spotted with violet. I. Chiefly east side! III. i. Queen of Spain's Chair, rare!

L. Munbyana B. & R. Sandy places; occasional? 2–5. Very small, with yellow flowers, seeds with a thick wing. A species I believe to be this, frequent in the stations cited, has very dark seeds, with a dark, but scarcely thick wing. I have seen no other specimens, but all allied species have pale seeds, with a very pale diaphanous wing. III. i. Between Gibraltar and San Roque, *Schousb.* Beyond Second Pine Wood!? ii. Between M. de la Torre and Palmones Bridge!? iii. Palmones Sands!?

[*L. Haenseleri* B. & R., like last, but seeds with a very pale thin wing, is reported by Dasoi from the neighbourhood, but not confirmed.]

L. tristis Mill. Rocks; locally frequent; 3–6. Flowers varying from dingy yellow to reddish brown. I.! III. i. Alcadeza Crags! San Roque, *B. & R.*

L. melanantha B. & R. Rocks; rare; 3–6. Flowers almost black, but often drying quite pale, leaves narrow, ½ line or less, calyx segments narrower. Scarcely distinct from last. III. ii. Waterfall Valley!

Digitalis purpurea L. var. *tomentosa* Webb. Woods; locally frequent; 4–6. III. i. Almoraima! Mountain Woods at San Roque, *D.* ii. Mountains!

†*Lafuentea rotundifolia* Lag. Bushy rocky places; rare; 4–5; not found recently. I. *Brouss.*

Sibthorpia europæa L. Wet places in mountains; locally common; 5–9. III. i. Foot of Alcadeza Crags! ii. Reaching high up the slopes!

Veronica Cymbalaria Bod. Walls and stony places; very common; 1–4. I.! III.!

V. agrestis L. Sandy fields; rare; 12–3. Flowers axillary, pale, calyx-lobes oval, capsule notch narrow, valves 4–6-seeded. I. North Front, near Cemetery! III. ii. Algeciras Station!

†*V. persica* Pourr. Similar places; rare; 1–3. Much larger, flowers bright blue, capsule lobes broad, flattish, divaricate. III. ii. Palmones Playazo!

V. polita Fries. Grassy places; rather rare; 3–4. Flowers bright blue, calyx lobes broadly ovate, capsule notch broad, valves 7–10-seeded. III. i. Lajo River bed! Almoraima! ii. Algeciras Station!

V. arvensis L. Similar places; frequent; 2–5. Flowers minute, blue, in bracteate racemes. I. North Front! III. i. First Pine Wood! Cork Woods! ii. Algeciras Station! Mountains!

V. Anagallis L. Wet ditches; frequent; 4–6. A polymorphous species. Mr. Druce refers specimens from Lajo Valley to the segregate *V. aquatica* Bernh., known by its very spreading pedicels and broad capsules, not narrowed below. Type *V. Anagallis* L. has ascending pedicels and capsules narrowed below. I cannot say which form prevails. III.!

V. anagalloides Guss. Similar places; frequent in the province; 4–6. Leaves and sepals narrower, capsule narrower, attenuate above. I have not identified it. II. *D.*

Eufragia viscosa Benth. Grassy places; common; 4–5. I. South and west slopes, *K.*, *D.* Signal Station! II.! III.!

Trixago apula Stev. Usually in drier places; common; 4–5. Flowers lavender and white. I. Breakneck Battery! Moorish Wall! II.! III.!

†Var. *lutea* Lge. has bright yellow flowers, known from *Eufragia* by its short broad sepals. I. East slopes Middle Hill! III. i. Rocky slopes of San Roque, *Wk.*, *K.*, *D.*

†*Bartsia aspera* Lge. Dry rocky places; locally frequent; 8–9. A Portuguese species, probably only a very scabrid form of the Pyrenean *B. spicata* Ram. III. ii. Tops of mountains! whence Reverchon records it.

Odontites tenuifolia Don var. *australis* Boiss. Dry bushy places; rare? 7–9. Very slender, flowers small, unilateral. The var. is a more glabrous form. III. ii. S. de Palma, *Rev.*

OROBANCHACEÆ.

In this difficult order I have, as a rule, only mentioned localities from which specimens have been named for me by Prof. Beck, as well as citing those already recorded. It might be misleading to give their apparent distribution, though several species are probably quite common.

Orobanche cernua Loefl. Apparently rare; 4–6. Corolla bluish, much deflexed, much constricted below mouth. III. ii. Near Algeciras, *Winkl.*

†*O. caryophyllacea* Sm. (*O. Galii* Vauch). Apparently rare; 3–5. Stout, corolla large and broad, wholly brown, stigmas brownish or violet. III. ii. S. de Palma in Los Barrios District, *Rev.*

†f. *macroglossa* Beck has corolla square in lateral aspect. III. i. Cork Wood Crags! (my 1669, pars, *teste* Beck). Confounded with *O. gracilis.*

†*O. Rapum-Genistæ* Thuill. Appears rare; 3–5. Larger than *O. gracilis*, with larger wider corolla, more uniformly brownish rose, not shining within? stigmas yellow. III. ii. S. de Palma, *Winkl.*, *Rev.*

O. gracilis Sm. (*O. cruenta* Bertol.). Rather frequent, at least locally; 3–6. Usually large, stout, corolla dull greenish yellow outside at base, reddish towards mouth, deep shining moroon inside, stigmas yellow. III. i. Queen of Spain's Chair! (*teste* Beck). ii. Frequent at the Waterfall! (*teste* Beck).

†f. *polyantha* Beck has smaller flowers in a longer spike. III. i. Cork Wood Crags! (my 1669, pars, *teste* Beck).

†Var. *Sprunneri* Beck (*O. reticulata* Beck, non Wallr.). Corolla larger, upper lip with broader lobes. III. Near Gibraltar, *Beck.* ii. Algeciras, *Beck.*

O. fœtida Poir. Either this species or the next often frequent in cornfields; 4–5. Corolla deep blackish crimson, 7–12 lines, filaments pilose below, inserted 1½–3½ lines above base, stigmas described as yellow, but Prof. Beck thus names my specimens with them deep red. I. *K.*, *D.* III. i. San Roque, *K.*, *D.* ii. Palmones Playazo, on *Ononis pinnata*! (my 1920, *teste* Beck). S. de Palma and S. de Luna, *Beck.*

†f. *pusilla* Beck is a reduced form. III. i. Second Pine Wood! (my 1978, *teste* Beck).

†*O. sanguinea* Presl. (*O. crinita* Viv.); 4–5. Like last, but corolla shorter, filaments subglabrous, inserted much nearer base, stigmas red. I. Bruce's Farm! (my 1958, *teste* Beck). On *Lotus*, *Salzm.* III. i. Algeciras, *Beck.*

[*O. reticulata* Wallr., recorded from the Rock by Lemann, and from San Roque by Dautez, is probably an error for *O. gracilis.* It is not known in S. Spain.]

O. crenata Forsk. (*O. pruinosa* Lap., *O. speciosa* DC.). On peas and beans; common, often a field full; 4–5. Tall, very stout, corolla large, lavender or bluish and white. I. Sandpits! III.!

O. densiflora Salzm. Rare, or passed over for one of the other yellow-flowered species; 4–5. Flowers yellow, in a very dense spike, corolla 5–8 lines, bracts as long as corolla tube, filaments auriculately lobed at base. III. ii. Near Palmones and Algeciras, *Hack.*, *Winkl.* (*teste* Beck). Algeciras, *Rev.*

†*O. mauretanica* Beck. Rare; 5–6. Near last, but spike longer and laxer, flowers much larger, bracts as long as corolla, filaments not lobed at base. Usually wholly bright yellow, or with brown bracts and sepals, and corolla streaked brown. Stigmas yellow or pink. III. i. Between Sprague's Farm and San Roque! (my 1985, 1986, *teste* Beck). A specimen from I. Devil's Gap (my 1939) may be the same.

[*O. pubescens* D'Urv. (*O. versicolor* Schultz). A specimen at Kew, from Algeciras, so labelled by Winkler, is unnoticed by Beck, and is probably one of the other yellow-flowered species.]

†*O. loricata* Reichb. Rare; 5–6. Flowers yellow, filaments hairy at base, very glandular at apex, bracts longer than corolla, calyx segments deeply divided, stigmas pink. III. ii. Algeciras, *Rev.* (*teste* Beck).

†*O. Picridis* F. Schultz. Apparently rare; 5-6. Very near last, but filaments glabrous at apex, bracts as long as corolla, calyx segments bidentate to middle or less. I. Near Breakneck! (my 2118, *teste* Beck). A form near *O. Boissieri* Reichb. f., which is a step towards *O. amethystea* Thuill.

†Var. *Carotæ* Beck is a dense flowered form, with less glandular-pilose reddish violet bracts, and subglabrous corolla with violet veins. I. Gibraltar, *Beck.* III. ii. Algeciras, *Beck.*

O. minor Sutt. Occasional? 5–6. A most variable species. I. West slopes, *K.*, *D.* III. ii. Algeciras, *Rev.* (*teste* Beck).

f. *concolor* Beck (*O. concolor* Duby) is a wholly yellow form. III. iii. Sands at Guadacorte! (my 1913, *teste* Beck).

[*Phelipæa cærulea* C. A. Mey (*O. cærulea* Vill.) recorded by Kelaart from the Rock is unknown in Spain.]

[*P. ramosa* C. A. Mey. (*O. ramosa* L.) also recorded from Gibraltar by Kelaart is not known in the South of Spain.]

P. Muteli F. Schultz. Apparently frequent; 3–5. I. Gibraltar, *Beck.* III. i. San Roque, *Beck.* ii. Algeciras, *Beck.*

†*P. nana* Reichb. f. Rare? 4–5. Like last, but corolla shorter, segments of lip more acute, tube less constricted in middle. III. i. Cork Wood Crags! (my 1736, *teste* Beck).

LABIATÆ.

Lavandula Stœchas L. Dry bushy hills; rare in Gibraltar, abundant in Spain; 2–6. Leaves quite entire. I. South and west slopes, *Tournef.*, *Schott*, *K.*, *D.* III.!

†*L. dentata* L. Similar places; common on Rock, rare in Spain; 11–4. Leaves dentate. I. Chiefly above Alameda and above Levant, but frequent elsewhere! A whitish-flowered form occurs near Jews' Cemetery! III. i. San Roque, *D.*? Not confirmed.

L. multifida L. Similar places; common on Rock, rare in Spain; 11–4. Leaves pinnatifid. A white-flowered form is found. I.! III. i. Near San Roque, *Boiss.*, *Pourr.*

Mentha rotundifolia L. Damp grassy places; very common; 6–8. I. North Front, *K.* A few plants above Devil's Gap! II.! III.!

†Var. *macrostachya* W.-Dod (*M. macrostachya* Ten.) has shorter denser spikes. III. ii. Algeciras, *Rev.*

†*M. Bauhini* Ten. Similar places; rare; 6–8. Taller, less tomentose, spikes very dense, short and acuminate, many in a lax panicle. Perhaps only a variety of last. III. ii. Algeciras, *Rev.*

†*M. aquatica* L.? Similar places or in water; rare; 7–9. Debeaux throws doubt on the occurrence of this species, and Perez Lara does not record it, but I have seen leaves of what appears to be a glabrous form in the stations cited. III. i. In the Lajo at First Pine Wood!? ii. Near Arroyo Gaba!? Slopes south of Algeciras!? iii. In a copse at Guadacorte!?

M. Pulegium L. var. *villosa* Benth. Grassy places; very common; 6–9. Young leaves and shoots usually quite glabrous, but flowering stems almost always very tomentellous. I. North Front, *K.*, &c., not there now. II.! III.!

Lycopus europæus L. Streams and marshes; locally rather frequent; 6–9. III. i. Cork Wood Sotos! ii. Mountains! iii. Guadacorte!

Origanum virens Hoffm. & Link. Dry banks; rare; 6–8. III. ii. S. de Palma, *Rev.*

O. compactum Benth. Dry places; rare; 6–8. Differs from last in narrower more glandular bracts, and perhaps only varietally distinct. III. i. Road to Malaga Gardens! Between San Roque and First Pine Wood!

Thymus hirtus Willd. Rocks and walls; rare? 5–7. Much confused with next, and Mr. A. B. Jackson is of opinion that all he has seen so labelled from the Rock belongs to that species. Willkomm suggests that it may be a variety of *T. vulgaris.* The distribution of our species requires further investigation. I. *Boiss.*, *D.* III. i. Carteian Hills, *K.* ii. Waterfall Valley? not seen in flower.

†*T. diffusus* Salzm. Similar places; common on the Rock; 5–7. Differs from last chiefly in narrower floral leaves, though in Masson's specimen, cited as typical, as well as in all I have examined, they are twice as broad as cauline. I.!

†*T. vulgaris* L. Similar places and rough ground; rare? 5–7. Cauline leaves much broader and flowers pedicelled. I. *Gaudichaud.* III. i. Carteian Hills, *Von Martius*, *K.*, and others.

†Var. *capitatus* Wk. has capitate inflorescence. I. *Rev.* My 917 from Moorish Wall near Middle Gate closely resembles this, but Mr. Jackson thinks it is only a form of last with lax branches and broader leaves.

Coridothymus capitatus Reichb. f. Dry hills; locally abundant; 5–9. I. *Gaudichaud.* III. i. North and West of San Roque!

†*Micromeria græca* Benth. Dry bushy places; frequent; 4–6. Only the variety is recorded by Debeaux, though the type seems equally frequent. I.! III. i. and ii.!

Var. *latifolia* Boiss. has leaves as broad as those of next. I.! III. i. and ii.!

M. nervosa Benth. Similar places; rare; 5–6. Inflorescence much denser, calyx very villous, teeth more spreading. III. i. By Pedrera, *D.*

Satureia inodora Salzm. Dry heathy hills; rare; 6–7. Rather like *Coridothymus*, but much more lax and straggling, with much laxer inflorescence. III. i. Top of Queen of Spain's Chair! ii. Cuartel de las Corzas, *Laguna.* S. de Palma, *Rev.*

[*Calamintha Nepeta* Savi (*Melissa Nepeta*) is recorded by Boissier and Kelaart from Gibraltar. It differs from next, which is often mistaken for it, in its subequal calyx teeth, throat hairs exserted, and smaller corolla.]

C. menthæfolia Host. (*C. officinalis* Benth.) var. *bætica* Ball. Similar places; locally abundant; 6–12. Lower calyx teeth much the longest, throat hairs included. The variety is more densely white tomentose, and more branched, with larger corolla, but scarcely differs from type, which is abundant elsewhere in the province. I.! III. i. Cork Woods! ii. Waterfall Valley!

C. Clinopodium Benth. Woods and bushy places; rather rare; 5–6. Our form seems to be var. *pterocephala* P. L., with long plumose calyx. III. i. Almoraima Soto! ii. Waterfall Valley!

Melissa officinalis L. var. *villosa* Boiss. Similar places; locally frequent; 6–7. The variety is a more villous form. III. i. Almoraima!? leaves only. ii. Waterfall Valley!

Rosmarinus officinalis L. Bushy and rocky places; rather rare; 11–5. I. Mediterranean Steps and Road! Near Signal Station! III. i. Cork Wood Crags!

Salvia triloba L. † var. *calpeana* Daut. & Deb. Rocky bushy places; very rare; 5–6. Shrub, 5–6 ft., leaves narrow, entire, wrinkled, some (very few in the only bush I have seen) with a pair of leaflets at base. Differs from type in being twice as large, with longer laxer spikes, and broader much less tomentose leaves. The entire-leaved form, var. *integrifolia* Rev., hardly differs from

S. officinalis, except in being shorter, with shorter, broader, less acuminate calyx teeth. I. About Ince's, apparently cultivated! Dautez describes the station as "rocks on west slopes," and Debeaux adds, "the indigeneity of this plant in the rocky and elevated ravines could not be doubted," so it doubtless occurs elsewhere, though I have repeatedly searched in vain for it. Colmeiro thinks it not native.

[*S. officinalis* L., *S. hispanica* L., and *S. viridis* L., are reported by Kelaart and Gaudichaud from the Rock. None is probable but *S. lavandulæfolia* may have occurred formerly.]

[*S. rotundifolia* is mentioned by Kelaart as found by San Roque road. There are three species of that name, none of them Spanish.]

†*S. Sclarea* L. Rough slopes; rare; 5–6. Leaves broad, subcordate, bracts very broad, strongly veined, flowers pale blue. III. ii. Near a cottage in valley above Frayle Bay!

S. tingitana Etth. Bushy places; rare; 5–6. III. Neighbourhood of Gibraltar, *Rouy*.

S. bicolor Desf. Banks of streams; locally frequent; 5–6. Very showy, often 3–4 ft. high, with large lavender flowers. [I. Communicated to Kelaart.] III. i. By Cagancha! Arroyo Viejo! Near Malaga Gardens! Towards Alcadeza Crags! iii. Mr. Patron informs me that it occurs with white flowers behind Guadacorte.

S. bullata Vahl. (*S. bætica* Boiss.). Dry banks; rare? 4-6. Leaves rather large, ovate lanceolate, bullate, flowers fuscous red. III. i. Cork Woods, *Boiss.*, *Schousb.* San Roque Road, *K.* Plentiful near Almendral, *K.*

S. Verbenaca L. Dry banks; common; 12–6. Corolla usually pale, rarely dark blue, much longer than calyx, upper lip much arched. Inflorescence very glandular, often short and dense. I. Chiefly lower Rock! III. i. and ii.!

Var. *præcox* Lge. (*S. clandestina* L.). Debeaux evidently uses this name for the next species, but according to Mr. Pugsley (Journ. Bot. 1908, p. 144) it stands for dwarf forms of *S. Verbenaca*. III. i. and ii.!

†*S. horminoides* Pourr. (non G. & G.). Similar places; common; 12–6. Always tall and eglandular, corolla much darker and smaller than last, upper lip scarcely arched. III. i. and ii.!

Nepeta tuberosa L. Rough bushy places; occasional; 5–7. Floral leaves and bracts quite herbaceous, not pellucid, reticulate-veined. I. By wall from Middle Gate to Signal Station! Near Farringdon's! Mediterranean Steps, a single plant! III. i. Malaga Gardens!

N. reticulata Desf. Similar places; rare or error? 7–8. Near last, but bracts submembranous, pellucid. I. *Clem.*?

N. Apulei Ucr. Similar places; rare; 4–6. Much more glabrous, floral leaves and bracts narrow, herbaceous, nerves strong, not reticulate. III. i. Near San Roque, *D.*

Lamium amplexicaule L. Chiefly in vegetable gardens; rather frequent; 2–5. I. Everywhere, *D.*, where I have not seen it. III. i. Cork Woods, far from cultivation! ii. and iii.! Pelayo!

L. flexuosum Ten. Woods; rather rare; 4–6. Closely resembling *L. album*, but lower lip of corolla with one, instead of 2–3 teeth, anthers glabrous, not bearded. III. i. About Almoraima! ii. Waterfall Valley!

Stachys germanica L. var. *lusitanica* P. L. Bushy hills; very common; 4–6. The local form of this polymorphous species does not vary much. It differs from type in its oblong cordate leaves, obtusely crenate, indumentum more tomentose, less silky, and flowers whitish, not purple. I. Above Engineer's Road! III.!

Var. *interrupta* Rouy, with whorls more distant than in type, seems hardly worth distinguishing. It is mixed with type everywhere. III.!

S. circinnata L'Hérit. Rocks; locally rather frequent; 4–5. I.! Not confined to south and west, as Debeaux says.

S. arvensis L. Fields and bushy ground; very abundant; 1–5. Occasionally with pure white flowers. III.!

S. hirta L. Chiefly in fallow fields; abundant; 4–6. I. Near Jews' Cemetery! Mediterranean Steps! A casual on Line Wall! North Front, *Frere.* II.! III.!

Betonica algeriensis De Noë. Mountain slopes; locally common; 5–7. A good species, I think. Inflorescence subspicate rather than capitate, flowers much smaller and paler than in *B. officinalis*, dingy pink, bracts and sepals often glandular punctate. III. i. Queen of Spain's Chair! ii. Mountains!

Ballota hirsuta Benth. Rough bushy places; rare; 5–6. I. Roadside above Willis's! South and west slopes, *D.*

Phlomis Herba-venti L. Bushy places; locally common; 5–6. III. i. Roadsides and fields towards S. Lorca! ii. Woods behind Algeciras, *K.*

P. purpurea L. Bushy places; abundant; 3–6. I.! III.! With pure white flowers on the Rock and near M. de la Torre!

†*P. fruticosa* L. Similar places; now extinct? 3–6. I. *Tournef.*, *Gaudichaud*, *K.*

P. Lychnitis L. Dry and stony places; rare; 5–6. Flowers yellow. III. i. South slopes of San Roque, *D.*

Marrubium vulgare L. Waste places near buildings; rather frequent; 4–7. I. Below Signal Station! Windmill Hill! Catalan Bay! III.!

Sideritis scordioides L. var. *Cavanillesii* Wk. Rocky places; rare; 4–7. Near next, differing mainly in calyx teeth with long spines, often spreading. I. *Masson*, *Martius*, *Link.*, teste *Wk.* Kelaart and others record the next species under this name.

†*S. arborescens* Salzm. Rough bushy places; occasional; 4–5. I. Levant! Near Queen's Gate! Engineer Road! Described as 4–5 ft. high; I have never seen it more than 2–3 ft.

S. angustifolia Lam. Similar places; rare; 5–6. Much more slender and elongate, less shrubby, with a more spinose calyx and narrow entire leaves. III. i. Plain below Malaga Gardens! a very glabrous form.

S. romana L. Dry and rocky places; rare; 4–5. Annual, with white flowers, floral leaves like cauline. III. i. S. Carbonera and San Roque, *D.*

Cleonia lusitanica L. Rough slopes; occasional; 5–6. III. i. Beyond Pedrera! Path to First Pine Wood! Pine Wood Plains! Alcadeza Crags! ii. Algeciras, *Frere.*

Prunella vulgaris L. Damp marshy places; frequent; 4–6. III. i. Almoraima Soto! By Lajo! ii. Mountains! Carnero Hills! iii. Guadacorte Marsh!

†*Prasium majus* L. Rocky places and old walls; very common on Rock, rather rare in Spain; 4–6. I.! III. i. At Carteia! ii. Old walls at Algeciras! Carnero Hills!

Ajuga Iva Schreb. Dry hills; rather rare; 3–7. III. i. Carteian Hills! ii. Near Sandy Bay! iii. Guadacorte!

Var. *pseudo-Iva* Benth. with yellowish, not rose flowers, and more revolute leaves. Much commoner than type, and usually cleistogamous. I. Near Willis's! III. i. and ii.!

†*Teucrium campanulatum* L. Rare; 5–7. Leaves subbipinnatifid. III. ii. Near Algeciras, *Née.*

T. fruticans L. Bushy places; chiefly in woods; common; 2–5. I.! III. i. and ii.!

†Var. *latifolium* Rouy, with larger broader leaves, subvillous above. I. *Wk.*, *K.*, *D.* III. i. S. Carbonera, *D.* ii. S. de Palma, *Rev.*

†Var. *rotundifolium* Daut. & Deb. Leaves shorter, broader, half the size, roundish ovate, green above. I. III., i. and ii. Same collectors.

†*T. bracteatum* Desf. Dry grassy hills; rare; 6–7. Whorls several-flowered, not secund, bracts ovate lanceolate, longly petiolate, calyx segments subequal, flowers pink. A Moroccan species, reported from Tarifa according to Ball, but not recently found. III. ii. Ridge between Carnero and Pelayo!, dwarf specimens in an exposed situation.

T. Scorodonia L. Bushy and rocky places in mountains; locally common; 5–7. The type is subglabrous and eglandular. III. ii. El Cobre, &c.! Other examples from Waterfall Valley have a more or less glandular-ciliate calyx, but are best under type.

Var. *bæticum* P. L. Inflorescence very glandular, corolla tube shorter. I. *Brouss.*!, *Salzm.*, *Durand*, *&c.* III. i. Queen of Spain's Chair! Alcadeza Crags! ii. Mountains!

Var. *pseudo-Scorodonia* P. L. Leaves longer, less deltoid, whitish-tomentose beneath. I. Rare, *K.* III. i. Queen of Spain's Chair!

T. resupinatum Desf. Cultivated fields; frequent or common; 5–6. Leaves dentate or subentire, corolla resupinate. III. i. and ii.!

T. scordioides Schreb. Marshy spots; very local; 7–8. III. iii. Palmones Sands! Thicket near Guadacorte!

†*T. lucidum* L. Rough slopes; rare; 6–7. Aspect of *T. Chamædrys* L., but quite glabrous, with shining leaves. I.? Between Old Man's Garden and Engineer's Road, *Robinson.* Not confirmed.

T. Polium L. Rough bushy places; locally common; 4–7. I.! III. i. Cork Wood Crags! Near Malaga Gardens!

Var. *aureoforme* Rouy has yellowish tomentum. Debeaux says he has submitted specimens from the Rock to M. Rouy, who says they are not *T. aureum* Schreb., as at first supposed. I. Near Middle Gate of Charles the Fifth's Wall!

VERBENACEÆ.

Verbena officinalis L. Waste places; frequent; 5–10. I. Not common, *K.* II. Frequent, *K.* III.!

V. supina L. Similar places; rare; 4–6. II. *D.* III. i. Sand desert, *D.* ii. One or two places in Algeciras!

Vitex Agnus-castus L. Sandy ground; occasional; 7-8. II.! III. i. Near Agua Mayorga, *D.*, *Boiss.* Lane to First Venta! Almoraima! Towards S. Lorca! ii. Near Algeciras and El Saladillo! Arroyo Gaba!

ACANTHACEÆ.

Acanthus mollis L. Bushy places; abundant on dry limestone on the Rock, and by watercourses in Spain, very rarely dry places; 4–6. I.! III.! Long Stables Ravine and Alcadeza Crags are the only dry spots in which I have seen it.

LENTIBULARIACEÆ.

Pinguicula lusitanica L. Stream beds; locally frequent; 4–7. III. i. East slopes Queen of Spain's Chair! ii. Mountains!

PRIMULACEÆ.

Coris monspeliensis L. Sandy places; locally frequent; 3–6. III. i. Cork Wood Crags! Alcadeza Crags! S. Carbonera and San Roque, *D.*

Lysimachia Ephemerum L. Damp bushy places; locally frequent; 6–7. III. i. Almoraima Soto! iii. Guadacorte Marsh!

Asterolinum stellatum Hoffm. & Link. Dry hills and mountains; common; 3–4. III. i. Queen of Spain's Chair! Bonel's Farm! About San Roque! Cork Woods! ii. Mountains!

†*Centunculus minimus* L. Damp grassy places; rare; 4–6. III. i. Near San Roque, *Ball*! ii. Near Algeciras, *Nilss.*

Anagallis crassifolia Thore. Marshy places; locally frequent; 4–6. Flowers white. III. i. Near top of Queen of Spain's Chair! Alcadeza Crags! ii. Mountains!

A. arvensis L. Dry hills and fields, tilled and native; common; 2–5. Flowers red. I. *K.* II.! III.! With pale pink flowers (var. *carnea* Schr.) behind Algeciras engine shed!

A. cærulea Lamk. Similar places; abundant; 2–5. Flowers blue. Varies greatly in size, the small-flowered forms may be *A. parviflora* Hoffm. & Link. I.! II.! III.!

Var. *latifolia* Lge. is larger, stouter, leaves broadly ovate, subcordate, semiamplexicaul, calyx segments longer and broader. Frequent on Rock. Perez Lara says it is commoner than type in province, but I have not found it so. I.! III.!

†*A. platyphylla* Baudo. Similar places; rare; 5. Annual, like last, but flowers 1½ in. diameter, leaves 1 in. broad. III. i. Rocky grassy places on south slopes of San Roque, *D.*

A. linifolia L. Sandy places; locally frequent; 4–6. Perennial, leaves linear or narrow lanceolate, flowers very large. I. *Masson, Finlay*!, *B. & R.* II. *D.* III. i. Alcadeza Crags and Plain! Cork Wood Crags! ii. Palmones Playazo! iii. Palmones Sands!

Samolus Valerandi L. Wet places; frequent; 4–9. I. Caves at Europa Point, *K.* Rocks over North Front, *D.* II.! III.!

PLUMBAGINACEÆ.

Armeria macrophylla B. & R. (*A. bœtica* var. *stenophylla* Boiss.). Heathy places; locally frequent; 4–6. Leaves long, very slender, in dense tufts, calyx lobes truncate, mucronate. I.? *Finlay*! *Willd.*, teste *Wk.*, *Masson.* III. i. Cork Woods! Pine Wood Plains!

A. bœtica Boiss. Grassy places; locally frequent; 3–6. Leaves shorter and broader, calyx lobes acuminate, cuspidate. III. i. Bonel's Farm! Linea and Campamento, *Frere.* ii. and iii.!

Var. *hirta* Boiss. has leaves and calyx ribs more hirtulous. II. or III. i. Sands near Gibraltar, *Willd.*, *D.* ii. Sandy Bay!?

Statice ferulacea L. Salt marshes; locally frequent; 5–7. Leafless, flowers at ends of branches, outer bracts and calyx longly aristate. III. i. Rare on Bonel's Farm! ii. Algeciras, *Rev.* iii. Guadarranque Marshes! Aguacorte!

S. diffusa Pourr. Similar places; rare; 6–7. Like last, but flowers fewer, at base of branches, bracts and calyx not longly aristate. III. ii. Near Algeciras, *Nilss.* iii. Palmones, *Nilss.*

S. virgata Willd. Similar places; rare or error? 6–10. Leaves narrow spathulate, panicle with many barren branches. I. Sands and rocks by shore, *Laguna*? Possibly the next mistaken for it.

S. spathulata Desf. var. *emarginata* Boiss. Rocks by shore; locally abundant; 5–6. Dense tufts of rigid spathulate emarginate leaves, no sterile branches. I. From Europa Point to Monkey's Cave! Beyond Catalan Bay! III. ii. Algeciras, *Rev.*

S. lychnidifolia Gir. Muddy salt marshes; locally common; 5–6. Radical leaves few, large, oblanceolate. III. i. Above Guadarranque Ferry! ii. Palmones Playazo! iii. Guadarranque Marshes! Recorded by Née as *S. ovalifolia* Poir.?

S. sinuata L. Sandy slopes and rocks near sea; locally common; 4–6. I. Europa Point to Governor's Cottage! III. i. Sands at foot of S. Carbonera, *Wk.* ii. Algeciras, *Rev.*

PLANTAGINACEÆ.

Plantago Psyllium L. Dry slopes and fields; very common; 3–5. The common form is var. *dentifolia* Wk., with broader leaves, with 2–3 rather long teeth each side, but I think the type with entire or denticulate leaves also occurs. I.! II.! III.!

P. amplexicaulis Cav. Similar places; rare; 3–6; Annual, stems 1–4 in., leaves mostly basal, linear lanceolate, petioles short, broadly amplexicaul, and large subglabrous flowers. III. ii. Algeciras, *Winkl.*

[*P. Lœflingii* L. was reported in error to Kelaart from the Rock.]

P. Lagopus L. Similar places; frequent; 4–6. Like *P. lanceolatum* but annual, with very longly villous calyx. Var. *lusitanica* Ball differs chiefly in the quite unimportant character of taller scapes, and is inseparable from the type. I. Windmill Hill!, and elsewhere in the south, *Deb.* III. i. San Roque, *D.* ii. Near Algeciras, *Nilss.* iii. Near Los Barrios Station!

Var. *vaginata* W.-Dod (*P. vaginata* Vent. Jard. Cels. t. 29) has a long stem sometimes 1 ft. high. It is as common as type or var. *lusitanica*, and is connected by every intermediate. I.! III.!

P. lanceolata L. Grassy places; frequent? 3–5. Perennial, corolla and calyx glabrous. II.! III. i. Opposite Francia's Farm and elsewhere! ii. About Algeciras! Carnero Hills! The form is usually var. *eriophylla* Dcsne., but I have seen type.

P. Bellardi All. Dry sandy places; very common: 4–5. A low annual, with short thick spikes and grey pubescent leaves. I. Willis's! South and west slopes, *K.*, *D.* III. i.!

P. Serraria L. Rather damp clayey soil; abundant; 4–5. Leaves bright green, glabrous, remotely coarsely dentate, spikes long, cylindrical. I. Windmill Hill! II.!? III.!

†*P. maritima* L.? Salt marshes; rare; 4–5. Leaves very narrow, usually entire, capsule 2-seeded. III. iii. My 2060 from near Los Barrios Station may be this, but the leaves are rather broad and have one or two teeth, the capsule is 2-seeded, but this sometimes occurs in *P. Serraria.*

P. Coronopus L. Sandy ground; abundant; 1–12. Fairly constant in character in our region. I.! II.! III.!

Var. *crithmifolia* Wk. (*P. Ceratophyllum* Hoffm. & Link.) is larger, with bipinnatifid leaves, and a broader rachis. I. Catalan Bay! Sentry Fence! Governor's Cottage!

P. major L. Chiefly in vegetable gardens; occasional; 3–9. I. *K.* III.!

[NYCTAGINACEÆ.]

[*Mirabilis Jalapa* L. is more or less established above Devil's Gap, at Sandpits, and in gardens.]

AMARANTHACEÆ.

Amaranthus albus L. Roadsides and gardens; occasional; 6–9. Pale green, with sessile axillary spiny clusters. III. i. Near Punta Mala! Railway near Second Venta! A weed of cultivation elsewhere!

A. Blitum L. Similar places; rare; 5–9. I.? "Gibraltar," *Brouss.* without precise locally, but perhaps not on the Rock.

A. chlorostachys Willd. Waste and cultivated soil; rare; 12–5. Dark green, with dense terminal and lateral spikes, floral bracts spinose. III. i. Gardens at First Venta! ii. Algeciras Station!

A. deflexus L. Similar places; frequent; 1–12. Prostrate, with short axillary and terminal spikes, bracts muticous. Leaves often blotched with white or black as in *A. Blitum.* About the Town and at South Barracks! II.! III. i. River bed at Almoraima! Campamento! ii. Algeciras Station, &c.!

†*Achyranthes argentea* Lamk. Grassy bushy places; local; 3–6. I. Above Alameda Parade! Below Mediterranean Tunnels! Monkey's Cave! Dockyard! Sandpits! Above Catalan Bay!

**Alternanthera Achyrantha* R. Br. By walls and waste places; rare; 7–10. Clusters axillary, silvery white. I. *Haensl.* III. ii. Algeciras, *Rev.*

*†*Pupalia atropurpurea* Moq.-Tand. Similar places; rare; 5–6? Inflorescence spicate, in distant globose, woolly spiny clusters. III. ii. Algeciras, *Rev.*

CHENOPODIACEÆ.

Salsola vermiculata L. Salt marshes; locally frequent; 6–9. Shrubby, with white stems. A glabrous form, probably var. *microphylla* Moq.-Tand., but erect, not prostrate. III. iii. Guadarranque Marshes!

S. Kali Ten. In deep sand on or near the shore; very common; 6–9. I. Near Lighthouse! II.! III.!

Var. *rosea* Moq.-Tand. Glabrous, purplish, wings of perianth rosy. II. *K.*, *D.* III. i. Sand Desert, *K.*, *D.*

S. Soda L. Sandy places near sea; rare; 7–9. I. *Gaudichaud.* III. ii. Marsh at Palmones Playazo! iii. Guadarranque Marshes!

Halogeton sativus Moq.-Tand. Salt marshes; rare; 7–9. Like a *Suæda*, but with long, membranous, spathulate perianth segments. I. *K.*

Suæda maritima Dum. Salt marshes and sands near sea; occasional; 7–10. I. By Inundation! Europa Point! II. *K.*, *D.* III. ii. Algeciras, *K.*, *D.* iii. Palmones Marshes! an erect form, subwoody below, but apparently annual.

S. fruticosa Forsk. Similar places; rare; 5–11. I. Rocks below Europa Point! Probably the plant which Kelaart thought might be *S. maritima* var. *salsa* Moq.-Tand., but quite suffruticose.

[*Salicornia fruticosa* L. is recorded from Neutral Ground and Algeciras by Kelaart and Dautez, but almost certainly in mistake for the next.]

Arthrocnemum macrostachyum Mor. & Delp. Salt marshes; locally abundant; 1–12. Each flower in a cup-shaped receptacle in one excavation of rachis, not each naked in a separate receptacle. II. *K.*, *D.*? III. ii. Palmones Playazo! iii. Guadarranque Marshes! Varying greatly in size and colour. Young plants have the appearance of *S. herbacea.*

Kochia scoparia Schrad. Salt marshes; rare; 9–10. III. ii. Near Algeciras, *Née.*

Obione portulacoides Moq.-Tand. Salt marshes and waste places near sea; rather rare; 8–10. I. Reclamation Road! III. ii. and iii. Palmones River and Marshes!

Atriplex Halimus L. River banks and near sea; local; 8–9. III. i. By Lajo between the fords! ii. Common on sandy shore hills at Algeciras, *Rev.*

A. hastata L.? Roadsides and waste places; common; 7–9. Only seen in young state. I. Governor's Cottage and elsewhere! II.! III.!

A. angustifolia Sm. Similar places; rare; 7–11. III. i. Railside about San Roque Station! iii. Palmones Marshes!

*†*Roubieva multifida* Moq.-Tand. Sandy places near sea; abundant, at least locally; 8–10. I. Rosia! North Front! II.! III.!

Chenopodium ambrosioides L. Roadsides and waste places; rather frequent; 6–11. The plant has a strong aromatic smell, and varies much in leaf cutting. I. Rosia! Reclamation Road! II.! III. i. Almoraima Station! First Venta! Towards Bonel's Farm! ii. Algeciras Station and elsewhere!

†Var. *pinnatifida* Wk. has pinnatifid leaves. III. iii. By Guadacorte Farm!

C. album L. †var. *paganum* Reichb. Cultivated and waste places; rather frequent; 6–10. Leaves narrowed below, panicle lax, racemes spicate, seeds acutely keeled. I. Very common, *K.*, *D.* I have only seen a plant or two at Sandpits! III. i. Campamento! First Pine Wood, &c.! ii. Algeciras Station! Palmones Playazo! iii. Salt Pans!

C. opulifolium Schrad. Similar places; rather frequent; 6–10. Leaves shorter, broader, even upper not narrowed at base, seeds with a thick obtuse keel. It is more general than my stations show. I. Reclamation Road! III. i. Cachon!

C. murale L. Similar places; common; 1–12. Shorter, denser, much more leafy, leaves often shining, strongly sinuate-lobed. I.! III.!

C. Vulvaria L. Roadsides and waste places; rare; 6–10. Small, prostrate, with a very fœtid odour. III. i. Beyond Campamento! ii. Algeciras Station!

[*C. Bonus-Henricus* L., communicated to Kelaart, was doubtless an error.]

Beta maritima L. Cultivated fields, roadsides, &c.; common; 4–6. I.! II.! III.!

†Var. *erecta* G. & G. A strict erect form, with leaves mostly cordate, appears to correspond with this variety. I. Europa Glacis!

[PHYTOLACCEÆ.]

[*Phytolacca dioica* L. is often planted, and *P. decandra* L. is half naturalized in old gardens.]

POLYGONACEÆ.

Emex spinosa Campd. Waste places; common; 2–4. I.! II.! III. i. and ii.!

Rumex crispus L. Ditches and damp places; rather frequent; 4–6. Panicle close and dense, leaves narrow, undulate, perianth segments rather large, entire. I. About the forts, *D.* III.!

R. conglomeratus Murr. Similar or drier places; rather common; 5–6. Panicle laxly branching, leaves narrow, flat, perianth segments small, entire. II.! III.!

†*R. Friesii* G. & G. Damp grassy places; rare? 5–6. Panicle much as last, perianth segments spinose-dentate. III. ii. S. de Luna in Los Barrios district, *Nilss.*

R. pulcher L. Dry gravelly and sandy ground; common; 4–6. Panicle divaricately branched, leaves panduriform, perianth segments spinose-dentate. I. Near Farringdon's! Governor's Cottage! II.! III.!

R. bucephalophorus L. Chiefly cultivated fields; very abundant; 4–5. I.! III.!

†Var. *perennans* Wk. is a perennant form. I. II. or III. Mobile sand at Gibraltar, and grassy places in the Bay, *Wk.* II. *D.* III. i. Sand desert, *K.*, *D.*

†*R. thyrsoides* Desf. (*R. intermedius* Guss., non DC.). Sandy and waste places; rather frequent; 4–5. Panicle dense, leaves lanceolate, fruit perianth large, entire. I.! III. i. Carteia! Alcadeza! ii.! iii. Salt Pans!

[*R. intermedius* DC. non Guss. has quite linear leaves, and a lax panicle. A specimen from San Roque so labelled by Ball is *R. thyrsoides.*]

R. tingitanus L. In deep sand; rather local; 4–5. Leaves triangular hastate, often crenately incised. I. *Boiss.* II. *D.* III. i. Linea! Puente Mayorga! ii. Palmones Playazo! iii. Palmones Village!

†*R. scutatus* L. Rocky and stony places; rather rare; 4–5. I. Slopes over Europa! Rocks below Europa Point! Devil's Gap! III. ii. Railway near Algeciras!

†Var. *glaucus* DC. non Boiss. is a very glaucous form, but not otherwise differing from type, with which it grows on the Rock!

Var. *induratus* Ball is very glaucous, the branchlets becoming indurated and spinescent, and outer perianth segments more reflexed. I. Rocks at Europa Point, *K.*, *D.*? I think it probable that var. *glaucus* DC. has been mistaken for it.

Polygonum equisetiforme Sibth & Sm. Sandy ground near sea; rare; 6–10. 3–4 ft., stem thick and woody, branches erect and virgate, or sometimes drooping, inflorescence leafless. III. i. Almendral! Guadarranque Ferry! ii. Palmones Playazo! iii. Palmones Village! Guadacorte Marshes!

P. maritimum L. Deep sand near the sea; occasional, formerly frequent; 4–11. I. North Front Sentry Fence! Catalan Bay! II. *K.*, *D.* III. i. Linea, *K.*, *D.* ii. Algeciras, *Née.* iii. Palmones, *K.*, *D.*

P. aviculare L. Waste and cultivated ground; common; 4–11. Varies less than in Britain. I think var. *agrestinum* Jord. is common, and var. *arenastrum* Jord. less so. I. North Front! Reclamation Road! III.!

P. Roberti Lois. (*P. Raii* Bab., *P. aviculare* var. *vegetum* Ledeb.?). Waste and sandy ground; frequent; 4–11. I retain this name to cover a species otherwise resembling *P. Raii*, but much stouter, and obviously perennial, with a thick woody stem. It is sometimes so large as to resemble *P. equisetiforme*, though usually prostrate, and with quite different inflorescence, but I fear I may have sometimes confounded the two. II. Neutral Ground! III. i. Roadside just beyond Campamento, and many other places!

P. Hydropiper L. Marshy places; locally frequent; 7–10. Racemes lax, rather nodding, taste biting. III. i. Cork Wood Sotos! ii. By Miel from source almost to Algeciras!

†*P. serrulatum* Lag. By streams; rather frequent; 1–12. Racemes erect, compact, flowers pink. III. i. By Lajo and its branches! Cork Wood Sotos! ii.!

P. Persicaria L. Vegetable gardens; occasional; 5–7. Racemes dense, rather short, many fruits trigonous. III. i. Near First Venta! ii. Palmones Playazo! Algeciras, *Rev.*

P. lapathifolium L. Similar places; rare; 5–7. Racemes larger and denser, fruits lenticular. III. i. Almoraima!

[*P. Convolvulus* L. Cultivated ground? casual; 6–9. I. *Lag.* Found by no other collector.]

THYMELACEÆ.

Daphne Gnidium L. Bushy places; common; 6–10. I.! III.!

D. Laureola L. var. *latifolia* Coss. Woods; rare; 2–5. III. ii. Summit of Waterfall Valley! S. de Luna in Los Barrios district, *Laguna.* This may be the same station.

Thymelæa canescens Endl. Heathy hill slopes; locally common; 1–4. An erect, branched shrublet, leaves densely white-tomentose, flowers in small clusters, perianth lobes much shorter than tube. I.? *Brouss.*! III. i. From Pedrera to Majarambout Crags! Near First Pine Wood!

T. villosa Endl. Similar places, and in mountains; rather frequent; 5–6. Diffuse, greyish hirsute, flowers solitary, axillary. I. *K.* II. Abundant, *Boiss.*, *Juss.*, *K.* Not there now. III. i. With last! ii. Mountains to summits!

T. hirsuta Endl. Similar places; rare; 10–4. A tall shrublet, with densely imbricate white-woolly leaves, corolla lobes as long as tube. II. *D.*, not there now. III. i. Linea and S. Carbonera, *K.*, *D.*

LAURINEÆ.

Laurus nobilis L. Mountain valleys; locally abundant? 3-4. III. ii. S. de Palma, *Wk.*! I have not seen this in flower or fruit, but think I have seen leaves in several places.

SANTALACEÆ.

Osyris lanceolata Hochst. (*O. quadripartita* Salzm.). Rocks and bushy slopes; common on Rock, rare elsewhere; 5–6. I.! III. i. Cork Wood and Majarambout Crags!

O. alba L. Similar places; rare or error? 3–5. Leaves much smaller, male cymes forming a leafless raceme. I. *Tournef.*? Leman's specimens from Gibraltar are certainly *O. lanceolata* and not this (see K. Fl. p. 174). III. i. Mountain region of San Roque, *K.*, *D.*?

Thesium humile Vahl. Stony rough ground; rare; 2–4. I. Above Levant Battery!

Aristolochiaceæ.

Aristolochia bætica L. (*A. glauca* Desf.). Rough bushy places; abundant on Rock, rather rare in Spain; 11–5. I.! III. i. Cachon! Alcadeza Crags! First Pine Wood! ii. Carnero Hills! Algeciras, *Rev.*

A. longa L. Woods and open grassy places; frequent; 2–5. I. *K.* III. i. Upper part of Campo Common! Carteian Hills, &c.! ii. and iii.!

[*A. rotunda* L. has a globose tuber, and a closed sinus to the leaves. I. *K.* Never confirmed.]

Euphorbiaceæ.

**Ricinus communis* L. var. *africanus* Mill. Waste places near buildings; occasional. The var. is a shrub. I never saw it annual. I. Reclamation Road! Sandpits! Lower Lines! III. i. San Roque! Puente Mayorga! Almoraima! ii. About Algeciras!

Mercurialis elliptica Lamk. Heathy ground; locally frequent; 3–5. Shrubby, erect and stiff, quite glabrous, leaves subcoriaceous, rather finely crenate. III. i. Second Pine Wood to Long Stables!

†*M. Reverchoni* Rouy. Bushy places and in woods; locally common; 1–6. Perennial, straggling, flaccid, leaves deeply incised. III. ii. All over mountains! Near Cachon Farm! Lobo Valley!

M. annua L. Waste places; abundant; 1–12. Very variable in size, and in colour and shape of leaves. The complete female appears rare. I.! III.!

Var. *ambigua* Duby is as common as type. I.! III.!

Crozophora tinctoria A. Juss. Cultivated ground; rare; 6–8. Annual, with some look of a *Heliotropium*, but very different inflorescence. III. i. Opposite Francia's Farm! By First Pine Wood! iii. Guadacorte!

Euphorbia Peplis L. Sands near sea; rare; 5–9. Leaves obliquely truncate at base, seeds large, smooth. II. *Hurst*! III. i. Sand dunes, *Brouss.*, *Duf.*, *&c.* iii. Palmones, *D.*

†*E. gibraltarica* W.-Dod in Journ. Bot. 1914, 13. Sandy or gravelly places; rare; 5–9. Like last, but leaves larger, blotched with reddish black, smaller capsules, and small blackish, 3-keeled, foveolate seeds. III. i. Railway at Second Venta!

E. Chamæsyce L. †var. *canescens* Boiss. Sandy or gravelly places; locally frequent? 5–9. Much smaller, seeds tetragonous, reticulate rugose. I. In small patches all over the Neutral Ground, and cannot fail to attract attention, *K.* In Fl. p. 70, Kelaart says the station is the North Front. I have not seen it in either, but it is easily overlooked. III. i. Sand Desert, *D.* Railway near Second Venta!

E. adenocarpa Guss. Cultivated fields; occasional; 4–5. Tall annual, glands entire, capsule and seeds quite smooth. III. i. Between San Roque and S. Lorca! ii. Near Cortijo Trinidad!

E. verrucosa Lamk. Damp woods and meadows; rare; 4–6. Perennial, 6–12 in., glands entire, capsule with cylindrical warts, seeds smooth, leaves finely serrulate, glabrous. III. i. San Roque, *Fritze*.

[*E. flavicoma* DC. Heathy places; rare; 4–6. Like last but shorter, capsule warts hemispherical, leaves closely serrate. I. *Dasoi*?]

†*E. rupicola* Boiss. Bushy rocky slopes; locally abundant; 12–6. Shrubby, much branched, 2–4 ft. or more, involucral leaves bright yellow, capsule densely warted. I. Chiefly Mediterranean Steps and Middle Hill! A form with densely pubescent leaves occurs at the former place! III. i. Alcadeza Crags, a much less branched form! ii. Mountains!?

E. pubescens Vahl. Marshes; common; 3–8. Stout, little branched; very villous, glands entire. III.!

†*E. pterococca* Brot. Dry fields; common; 2–5. Small, dark green, annual, glands entire, capsule with wavy wings. I. Near Michael's Cave! III.!

E. Helioscopia L. Roadsides and waste places; common; 1–5. I.! II.! III.!

E. exigua L. Fields and grassy places; abundant; 2–5. Leaves acute. III.!

Var. *retusa* L. Similar places; more abundant. Leaves shorter, retuse. Looks distinct but intermediates occur. III.!

Var. *tricuspidata* Koch. Leaves dilated and tricuspidate at apex. III. i. Between Gibraltar and San Roque, *D.* Malaga Gardens!? ii. Beyond Carnero Point!?

E. Peplus L. Roadsides and waste places; very common; 1–5. Foveæ of seeds four on back and three on sides. I.! III.!

E. peploides Gouan. Similar places; common? 2–4. Like last but usually smaller, seeds with three foveæ on back, two on sides. I.! II.! III. i. San Roque, *D.* ii. Algeciras, *Ball.*

E. falcata L. Similar places; rare? 4–6. Rather like *E. Peplus* but leaves broader, acute, capsule deeply sulcate and keeled, seeds transversely sulcate. III. i. Beyond Linea Cemetery! Cruz del Padre Ventura! Pinar de los Bigotes! iii. Railside near Guadacorte!

E. medicaginea Boiss. Sandy fields and gravelly slopes; abundant; 3–5. Annual, with bright yellow involucral leaves, glands bicornate, seeds black with white reticulate ribs. I. About Willis's! III.! Often forming large yellow masses in fields!

E. segetalis L. Cultivated fields and woods; rather rare? 3–6. Annual, dull glaucous green, capsule granulated on back, seeds ashy grey, irregularly foveolate. [I. Wrongly attributed to Von Martius by Kelaart.] III. ii. Slopes above Waterfall Valley! I think I have seen this elsewhere, but it closely resembles *E. terracina* externally, and I may have taken it for that.

E. portlandica L. Rough bushy places and woods; locally common; 3–5. Perennial, with closely imbricated dark green leaves, capsules granulated and seeds foveolate. I. From Europa to above Mediterranean Road! II. *K.*, *D.* III. i. Sand dunes and Spanish racecourse. *K.*, *D.* ii. Mountains over Pelayo!

†Var. *intermedia* Porta & Rigo. A tall very straggling form.

III. i. Cork Woods! Majarambout Woods! I do not know whether the name has been published.

E. bœtica Boiss. (*E. trinervia* Boiss.). Sandy places and among bushes; locally frequent; 3–6. Perennial, laxly branched, leaves narrow, capsule longly stipitate, smooth, seeds foveolate. I. Above Catalan Bay! Sea sand near Inundation, *K.* III. i. Bonel's Farm! Near Spanish racecourse, *Boiss.*, *Kel.* Alcadeza Plain! Cork Woods!

E. serrata L. Sandy and bushy ground; rare; 3–6. Leaves strongly serrate, the involucral bright golden yellow. I. *Lem.*! III. i. Bonel's Farm! Foot of S. Carbonera and of San Roque, *K.*, *D.* Pinar de los Bigotes! ii. Foot of S. de Palma, *K.*, *D.* iii. Railway near Guadacorte!

E. terracina L. (*E. provincialis* Willd.). Sandy places; frequent; 2–5. Perennial, many stemmed, capsule and seeds smooth. I. North Front! Reclamation Road! Sandpits! Victoria Battery! II.! III. i.! ii. Algeciras, *K.*, *D.*

Var. *latifolia* Boiss. has broad leaves. II. *K.*, *D.*

†Var. *angustifolia* Lange has narrow leaves. II. *K.*, *D.* III. i. Lajo below First Pine Wood!

†Var. *retusa* Boiss., leaves obovate, deeply obcordate. II. *K.*, *D.*

[*E. Esula* L. is wrongly attributed to Von Martius from the Rock by Kelaart.]

E. Paralias L. Sea sand; locally rather frequent; 5–8. Perennial with broad, coriaceous, adpressed leaves. I. *Ayala.* II.! III. i. Linea, *K.* First River! ii. Palmones Playazo! iii. Palmones Sands!

E. Characias L. Wooded and rocky places; locally frequent; 2–4. Tall, very stout, unbranched, often 3–4 ft. high, inflorescence racemose, glands purple, entire. I. About Signal Station Road! Always quite glabrous. III. i. Cork Woods about Almoraima! Always pubescent.

CALLITRICHACEÆ.

Callitriche verna Kuetz. Ditches or streams; rare? 5–10. Leaves mostly obovate, styles erect, deciduous, fruit with acute keel. An ambiguous species, probably included in next. III. i. Near San Roque, *Wk.*?

C. stagnalis Scop. Similar places; frequent; 4–5. Leaves as last, styles diverging, persistent, fruit winged. III. ii. In the mountains! Palmones Playazo!

†*C. hamulata* Kuetz. Similar places; rare? 4–5. Leaves, at least lower, linear, keel of fruit winged. III. i. Campo Common! ii. Near Palmones Pinar!

URTICACEÆ.

Theligonum Cynocrambe L. Rocks, walls and banks; locally common; 2–4. Stem and bright green leaves subsucculent. I.! III. i. Cachon! S. Carbonera, *D.*

Parietaria mauretanica Desr. var. *latifolia* Lge. Rocky and bushy places; local; 1–5. Leaves very broad, subcordate. I. North slopes, both sides!

P. diffusa Mert. & Koch. Similar places; abundant on Rock, less so in Spain; 1–12. Very variable. I.! III. i. Seen but no stations noted! ii. Palmones Playazo! About Algeciras! Carnero Hills!

Var. *fallax* G. & G. has subsimple erect stems. I.! I think frequent. Mr. Druce thinks my 1579, from Rock Gun Catchment, may be *P. erecta* M. & K., a distinct species like var. *fallax*, but with perianth not elongating after flowering, but the specimen is too young for determination.

P. lusitanica L. Walls and rocks; rare? 3–5. Like a diminutive diffuse *P. diffusa*, but leaves darker green, rounder, and glomerules subsolitary. I. Main road near St. Bernard's! Below Devil's Gap!

Urtica urens L. Waste and cultivated ground, chiefly near buildings; very common; 11–5. I.! II.! III.!

U. membranacea Poir. Similar places; equally common; 11–5. Usually diœcious, though described as monœcious. The female appears about six weeks after the male. I.! II.! III.!

[*U. dioica* L. is reported as common on the Rock by Kelaart and Dautez, but by no other collector.]

Celtis australis L. Hedges and rough slopes, often planted; 4–5. I. Levant! Signal Station Road, &c.! III. i. Lajo Valley!

**Ficus Carica* L. Rocks and stony places; completely naturalised in very many places; 4–6. I.! III.! Reaches high up the mountains!

[*Ulmus campestris* Sm. is probably always planted, as about Algeciras, El Cobre, Lajo Valley, &c.! I believe this species, but I have not seen fruit.]

[*Morus nigra* Willd. is only planted.]

CUPULIFERÆ.

Quercus lusitanica Webb. Woods; common; 3–4. Leaves very large, more or less deciduous.

Var. *faginea* Lge., the type, has dentate or subentire leaves, and appears rare. III. ii. S. de Palma, *Boiss.*, *Wk.*, *&c.*

Var. *bœtica* Webb has coarsely sinuate crenate leaves, and is common. III. i. Cork Woods! ii. Mountains!

Q. humilis Lamk. Woods and heaths; very common; 3–4. Leaves incanous beneath, hardly spinose. I think it seldom grows with *Q. coccifera*. III. i. and ii.!

Q. Suber L. Woods; abundant; 4–5. [I. Introduced.] III. i. and ii.!

Q. Suber × *Ilex* Lag. With the parents; rare; 4–5. III. i. Near San Roque, *D.*

Q. Ilex L. Woods; rare? formerly frequent? 4–6. I. Inaccessible places on west slopes, *K.* Near Breakneck Battery, two trees! Above Catalan Bay, one tree! III. i. Cork Woods!

Q. coccifera L. Heaths and woods; very common; 3–5. Leaves shining, quite glabrous both sides, often very spiny. I. Under the shade of larger trees, *K.* Are these not root shoots of *Q. Ilex*? I have not seen it. III. i. and ii.! In deep sand at Palmones Playazo!

AMENTIFERÆ.

Alnus glutinosa Gaertn. var. *denticulata* Regel. By streams, chiefly in woods; locally plentiful; 1–3. III. i. Cork Woods! ii. By many streams from the mountains above Algeciras! iii. Salt Pans!

Salix alba L. By water holes and streams, doubtless often planted, but native in many places; 3–4. III. i. About San Roque! Cork Woods! ii.! iii. About Salt Pans!

†*S. cinerea* L. Similar places; frequent, commonly planted by water holes; 1–3. III. i. By the Lajo! Cork Wood Sotos! ii. Waterfall Valley! Carnero Hills! iii. Salt Pans!

S. pedicellata Desf. Similar places; occasional or frequent; 1–3. Catkins produced on pedunculate leafy shoots, leaves like last. III. i. By Lajo at First Pine Wood! ii. Waterfall Valley!

[*S. babylonica* L. is occasionally planted, as by river above San Roque Station!]

Populus alba L. Woods and by mountain streams, often planted, but here and there native; 1–3. [I. Planted.] III. i. Near First Pine Wood! Almendral! Almoraima! ii. Valley over Frayle Bay! iii. Guadacorte!

[*P. pyramidalis* Rozier, the Lombardy Poplar, is often planted.]

CYTINACEÆ.

Cytinus Hypocistis L. On roots of *Cistaceæ*; occasional; 3–5. III. i. Summit of Chair! Cork Wood Crags! Pine Wood Plains! ii. Mountains south of Waterfall Valley!

CONIFERÆ.

†*Pinus halepensis* Mill. Woods; rare; 4–5. Cones rather long, shining, deflexed. III. i. Between San Roque and Castellar, *D.*

[*P. sylvestris* L. and *P. Pinaster* Ait. are planted. They both have small cones, *P. Pinaster* having longer leaves and larger cones, scales with acute ridges.]

P. Pinea L. Woods; frequent; 4–7. Cones large and ovoid or subglobose, scales with obtuse ridges. III. Forms the Pine Woods in many places, but also planted!

Juniperus Oxycedrus L. Rocky ravines; rare; 3–7. I. West slopes, *Schott*? III. i. Hills above S. Carbonera, *D.*

GNETACEÆ.

Ephedra fragilis Desf. Rocky slopes and sandy places; frequent on Rock, occasional in Spain; 4–6. Dr. Stapf says all he has seen from the Rock is the type, *i.e.* var. *Desfontainei* Stapf. It varies much in habit. I.! Especially about Levant! III. i. Puente Mayorga! ii. Palmones Playazo! Rocks at Algeciras, *Winkl.*!

[*E. altissima* Desf. (*E. gibraltarica* Boiss.?). Dr. Stapf says all he has seen from here so named is *E. fragilis*. The true *E. altissima* is a very different species.]

LEMNACEÆ.

Lemna gibba L. Water holes; occasional; 4–6. I. Near Inundation, *de Coincy*. III. i. Linea! ii. Palmones Playazo! iii. Palmones Sands!

L. minor L. Similar places; locally frequent; 4–6. III. i. Lajo below Almendral! ii. and iii. With the last!

NAIADACEÆ.

†*Zannichellia macrostemon* J. Gay. Pools; rare; 4–6. III. i. Near San Roque, *Nilss.* ii.!? My 1112, a young state, from a roadside pool towards Palmones Pinar, may be this or *Z. palustris* L., a frequent species in the province.

†*Potamogeton americanus* Cham. & Schl. (*P. fluitans* Roth). Streams; locally common; 6–8. III. i. In the Lajo and its tributaries! ii. In mountain swamps!

†*P. pusillus* L. var. *elongatus* Ar. Benn. Streams; rare; 5–6. III. i. In the Lajo and its tributaries!

[*Ruppia rostellata* Koch is reported from the Inundation and Neutral Ground by Kelaart and Dautez, and is attributed to Boissier by Debeaux, but Boissier's specimen is correctly labelled *R. maritima*!]

R. maritima L. (*R. spiralis* Dum.). In salt water; locally abundant; 8-10. Peduncles spirally coiled. I. The Inundation is full of it! Near the convict station, *K.*; now built on. III. ii. and iii. Salt marshes at San Roque and Algeciras, *Nilss.*

Zostera marina L. In the sea or tidal rivers; frequent? 6–7. I. Western shores, *K.* II. and III. All round the Bay, *K.*, *D.*

Posidonia Caulini Koenig. In the sea; rare? 4–8. With a large tuft of dead leaf sheaths at base, flowers in longly peduncled spathes. I. Near the North Front Guard, *Kel.*, *Boiss.* III. ii. Algeciras, *D.*

ALISMACEÆ.

†*Alisma ranunculoides* L. Pools, ditches and streams; very common; 4–6. II.! III.!

A. Plantago L. Similar places; much less common; 4–6. The type has leaves broadly rounded or cordate at base, and is rare. III. i. Sand desert below Pedrera, *D.*

Var. *lanceolata* G. & G. with leaves narrowed below, is the usual form. III. i. Lajo Valley! Carteian Hills! Campamento Common! ii. Algeciras, *Rev.* Palmones Playazo! iii. Salt Pans!

JUNCAGINACEÆ.

Triglochin maritimum L. Salt marshes; rare; 4–5. Spikes dense, fruit of six carpels. III. i. Sand dunes below S. Carbonera, *D.*

T. Barrelieri Lois. Fresh water marshes; occasional; 1–3. Spikes very lax, fruit of three carpels. III. ii. Palmones Playazo! iii. Guadarranque Marshes!

[*T. palustre* L. is recorded from near Gibraltar by Schott (*ex* Colm.) in addition to *T. Barrelieri*, but is unconfirmed.]

AROIDEÆ.

Arisarum vulgare Kunth. Dry open and bushy places; very abundant; 11–1. I.! III.!

Arum italicum Mill. Shady banks; rather frequent, and quite native; 3–4. I. Sandpits! Above Willis's! Above Engineer Road! III. i. Malaga Gardens! ii. and iii.!

[*A. maculatum* L. is recorded from Algeciras by Clemente, but is unconfirmed.]

[*A. Dracunculus* L. is subspontaneous here and there, but I have not seen it.]

**Colocasia antiquorum* Schott. Shady ravines; quite naturalised in one spot; 6–7. III. ii. Valley below Waterfall!

TYPHACEÆ.

Typha latifolia L. Pools and streams; rather rare; 6–7. My gathering has rather narrow leaves, 3–3½ lines wide, and male spike about ¼ in. above female. It may be a hybrid. III. i. Near Almoraima! ii. In the Miel! iii. Guadacorte Marshes! Salt Pans!

T. angustifolia L. Similar places; locally common; 6–7. More frequent than my records show. III. i. In the Lajo! ii. Carnero Hills! iii. Guadacorte Marshes! Salt Pans!

Sparganium ramosum Huds. In streams; locally common; 4–7. III. i. In the Lajo! Cork Wood Sotos! ii. In the Miel! Marsh below El Cobre! Towards El Saladillo!

PALMEÆ.

Chamærops humilis L. Bushy hills; very common; very rarely in woods or heathy places; 4–5. I.! Often with a trunk 4–6 ft. high. III.!

ORCHIDACEÆ.

Serapias cordigera L. Woods, rarely open ground; rather locally frequent; 4–5. I. West slopes, *K.*, *Schott.* III. i. Queen of Spain's Chair! S. Lorca! Cork Woods! ii. M. de la Torre! Palmones Pinar! Waterfall Valley, especially at El Cobre! My 1895, from marshy open spots near railway beyond upper Miel Bridge, is a peculiar form in an unusual situation, with small flowers, and a rather narrow lip, almost intermediate between type and *S. Lingua*, but Mr. Rolfe thinks it belongs here.

S. occultata J. Gay. Damp grassy places; rare? 4–5. Flowers smaller than next, hidden in bracts except lip, which is short, narrow, and reflexed, the basal ridges pale and distant. III. ii. Near Algeciras, *Rev.*, *Frere.* Carnero Point!

S. Lingua L. Similar places; very common; 4–5. Lower perianth lobes more exposed, lip nearly twice as long as last, and broader, basal ridges dark and close, so that they are described as one. I.? West slopes, *Schott.* II.! III.!

Orchis papilionacea L. Bushy ground; very rare; 4–5. Lip large, reddish purple. III. i. Magazine Hill, a single plant!

O. Morio var. *picta* Reichb. Woods and bushy places; rare; 3–5. Spur truncate, almost as long as ovary. III. i. Between

Almoraima and Long Stables! North slopes Alcadeza Crags! About San Roque, *Wk.*

O. coriophora L. var. *Polliniana* Reichb. f. (*O. fragrans* Poll.). Hedges; very rare; 4–5. Flowers rather small, livid purple, in a dense spike. III. i. A plant or two by railside beyond Almoraima!

O. lactea Poir. (*O. variegata* All. var. *acuminata* Boiss.). Rough slopes; rather rare; 2–3. I. Below Signal Station! Spy Glass! i. Grassy places in woods near San Roque, *Wk.*

O. longicruris Link. Similar places; very rare; 3–4. Allied to *O. Simia* Lamk. I.? West slopes, *Schott.*

O. laxiflora Lamk. var. *longibracteata* Wk. Marshy ground; very common; 3–5. The var. has a dense spike, with bracts longer than ovary, the lowest foliaceous, and is alone recorded, but I think type is found frequently. III. ii. and iii.! No note from i., but I believe it occurs.

†*O. palustris* Jacq. Woods; very local; 4–6. Flowers much paler, lower lip 3-lobed, the central largest and longest, usually divaricately lobed. III. ii. Upper Waterfall Valley!

O. longibracteata Biv. Woods; rare; 3–4. Leaves very large, sepals connivent, flowers large, lip rose-purple, spotted, 4-lobed, the two central divaricate. III. i. S. Carbonera, *Frere.* ii. Algeciras, *Frere.*

†*O. cordata* Willd. Rough shady slopes; locally rather frequent; 2–4. Flowers green, leaves broadly ovate, cordate. I. Upper Rock from Lower Union Gallery to Mediterranean Steps! Rocks above Catalan Bay! III. i. Cork Wood Crags, rare! ii. Waterfall, rare!

Ophrys aranifera Huds. var. *atrata* Reichb. Rocky slopes; rare; 3–4. Lip longer than sepals, subtrilobed, blackish purple, basal bosses conical, salient. I. South and west slopes, *Frere, Schott, D.* A specimen from the Rock by Lemann, labelled *O. aranifera*, is *O. fusca*!

O. tethredinifera Willd. Grassy and bushy slopes; locally rather frequent; 2–4. Rather like next but shorter, with a shorter spike. I. Communicated, *K.* III. i. Queen of Spain's Chair! Carteian Hills! North of San Roque! ii. North of Algeciras! El Cobre! Carnero Point!

O. apifera Huds. Watercourses and marshes; rather common; 4–5. Occasionally almost white. I. About Willis's! Glacis, a single specimen! South slopes, *D.*, *Rev.* III. i. Carteian Hills! Campamento Common! Long Stables! ii.! iii. Guadacorte! Salt Pans!

O. Scolopax Cav. Dry bushy places; rather rare; 4–5. Rather like last, but flowers much smaller, usually white, rarely pale rose. III. i. Near San Roque Station! S. Carbonera, *D.* By Arroyo Viejo near Patxot's farm! Alcadeza Crags! ii. About El Cobre! Hills west of Algeciras!

O. bombyliflora Link. Grassy places; frequent; 2–4. Flowers greenish, lip dark, with very acute bosses. I. One or two specimens near Signal Station! II.! III. i. Path to First Pine Wood, and on neighbouring hills! ii. Common, to Carnero Point!

O. Speculum Link. Similar places; rare; 3–4. Lip with a large dark blue shining patch, and a papillose fringe. I. Two specimens below Signal Station! III. i. Path to First Pine Wood! Cork Wood Crags! ii. S. de Palma, *Wk.*

O. fusca Link. Rough and grassy slopes; locally rather frequent; 1–3. Lip narrow, dark, with very narrow yellowish edges. I. West slopes! III. i. North of San Roque, occasional! Carteian Hills! ii. Algeciras, *Frere.*

O. lutea Cass. Similar places; rather frequent on Rock, rare in Spain; 2–4. Lip broad, with a broad yellow margin. I. Northwest slopes to Signal Station! *Débris* slopes over North Front! III. i. Queen of Spain's Chair, common, *K.* I have never seen it there. Malaga Gardens! ii. Near Sandy Bay! Hills near Algeciras *K.* iii. Guadacorte!

†*Neotinea intacta* Reichb. (*Aceras densiflora* Boiss.). Woods; rare; 4–5. Spikes dense, unilateral, flowers small, pinkish white. III. i. Queen of Spain's Chair, rare, *K.* ii. Between Waterfall Valley and Pelayo!

Spiranthes autumnalis Rich. Rocky places; rare; 10–11. Leaves broadly oval, after flowers, flowers yellowish white. I. From Willis's to Signal Station!

†*S. æstivalis* Rich. Damp grassy places; very rare; 5-6. Leaves lanceolate, contemporary with white flowers. III. i. East slopes Queen of Spain's Chair! ii. Beyond Waterfall!

Epipactis atrorubens Schultz. Woods; rather rare; 4–6. Flowers rather deep red, lip with crisped plicate bosses. III. i. First Pine Wood! ii. Mountains!

Cephalanthera ensifolia Rich. Woods; rare; 3–4. III. [i. Boca de Leon, *Hurst*!], beyond our limits. ii. Slopes south of Waterfall!

†*Limodorum abortivum* Sw. Woods; rather rare; 4–6. Whole plant lavender and white. III. i. Near Long Stables! Majarambout Woods! ii. Waterfall Valley!

IRIDACEÆ.

Gladiolus segetum Gawl. Cornfields; rather rare? 4–5. Flowers large, distichous, middle perianth segment twice as broad as lateral, seeds not winged. Confounded with next, and certainly not our common species. I.? *K.* III. i. Fields by Lajo! Pinar de los Bigotes! ii. Near railway beyond Algeciras!

G. communis L. Hills, bushy places and fields; very common; 4–6. Flowers much smaller, unilateral, middle segment not much broader than lateral, seeds broadly winged. I.! III.! Reaches high up the mountains!

Iris Sisyrinchium L. Dry fields and roadsides; common; 2–4. I.! II.! III.!

I. Fontanesii G. & G. Grassy places; very rare; 4–5. Resembles *I. Xiphium* L., with large blue flowers. III. ii. Near upper aqueduct! Railside near San Bernabe! One or two plants in each place.

†*I. filifolia* Boiss. Rough heathy and bushy slopes; frequent and locally common; 4–5. I. Upper Rock from north to south!

III. i. Queen of Spain's Chair, *Porta & Rigo*! South slopes of San Roque, *D.* Alcadeza to Majarambout! ii. Waterfall Valley, plentiful!

†*I. juncea* Poir. (*I. lusitanica* Ker). Similar places; rare; 5. Like last, but flowers yellow, tube much shorter. III. ii. Mountains near Algeciras, *Rev.*

I. Pseudacorus L. Swamps and watercourses; locally common; 2–4. III.! Common in Cork Woods!

I. fœtidissima L. Woods; rather rare; 5–6. III. i. Almoraima! ii. Mountains! Carnero Hills!

I. scorpioides Desf. (I. *alata* Poir.). Grassy sandy places; rare; 1–2. III. i. Slopes south of San Roque, *D.*

Romulea Clusiana Lge. Sandy and grassy places; locally abundant; 1–3. Flowers very large, with a bright yellow base. I. Chiefly Europa Flats, Windmill Hill, and North Front! Occasionally on upper west slopes! II.! III. i. Near Spanish racecourse, *Clus.*, *D.*

R. Bulbocodium Ker. Similar places; rare? 1–3. Flowers much smaller, upper spathe membranous, stigmas bipartite, often longer than stamens. [I. Kelaart's note obviously refers to last.] III. i. San Roque, *D.* S. de Palma, *Rev.* Often confounded with *R. ramiflora*, but it is common in the province.

[*R. purpurascens* Ten., recorded by Willkomm and Dautez from San Roque, was founded upon a garden specimen, allied to the South African *R. rosea* Eckl.]

R. ramiflora Ten. Similar places; very common; 1–3. Smaller than *R. Bulbocodium*, upper spathe herbaceous, stigmas bilobed, usually shorter than anthers. II.! III.!

R. gaditana Beg. (*R. Linaresii* Parl. var. *gaditana* Kunze). Similar places; occasional? 1–3. Confounded by Willkomm with *R. ramiflora*, from which it differs chiefly in its much larger flowers, 2–4 times as long, and deeper in colour. III. i. Sand Desert, *D.*, teste *Beguinot.* This may be the plant recorded by Dautez as *R. Columnæ.* Bonel's Farm!? ii. Hills near the Miel!? Specimens from the last two stations (my 148 and 165) probably belong here, but the upper spathes are almost wholly membranous, instead of half herbaceous. They cannot be referred to any of our other species.

R. parviflora Britten in Journ. Bot. 1914, 46 (*R. Columnæ* auct.). Similar places; occasional? 1–3. Like *R. ramiflora*, but flowers very small, pale, seeds dull, angular. II. *D.*? III. i. Sand Desert, *D.*? It is probable that Dautez has confounded the two.

Crocus Salzmanni J. Gay. Bushy places; rare; 10–11. Differs from *C. serotinus* Salisb. in orange, not white filaments, and yellowish, not white throat, and broader leaves. Discovered by Maw (Monog. Gen. Croc. p. 103). I. Windmill Hill!

AMARYLLIDACEÆ.

Leucojum trichophyllum Brot. Sandy or light soil; very rare; 1–3. III. i. [In great profusion on Spanish racecourse, *K.* Kelaart obviously refers to next.] In 1883 I found this in small quantity by the path to Rocadillo, which is now all cultivation and I think it is exterminated!

L. autumnale L. Similar places; locally abundant; 10–1. [I. A few specimens at Willis's and Ince's, where I planted it in 1883!] III. i. Punta Mala! Campo Common!

Carregnoa humilis J. Gay. Similar places; very rare; 10. III. i. Carteian Hills near Puente Mayorga! Near Almoraima, *D.*

Pancratium maritimum L. Sand dunes by sea; locally abundant; 7–9. I. North Front! II.! III.!

Corbularia Bulbocodium Haw. Rocks on tops of mountains; locally common; 12–3. III. ii. On all the highest ridges!

Narcissus serotinus L. Gravelly places; rather frequent; 10–11. Tall forms with 2–4 flowers are var. *major* P. L. III. i. Campamento Common to Pindalista! Alcadeza Plain! Probably elsewhere, but not seen in flower.

†*N. viridiflorus* Schousb. Damp gravelly and clayey places; frequent; 9–10. In 1883 I gathered on Campo Common, with Maw, a hybrid between this species and the last. III. i. Sand Desert, *D.* Campo Common to San Roque! Carteian Hills! Second Venta! ii. Palmones Pinar to Sandy Bay, and commonly near Algeciras!

N. niveus Lois. Rough bushy places or marshy ground; common, locally abundant; 10–3. On the Rock this grows in dry bushy spots, flowering from October to February; in Spain it inhabits marshes, and flowers from January to March. It varies greatly in shape of perianth segments. I.! III.!

[*N. polyanthus* Lois., a frequent species in the province, with subterete scape, and pale yellow entire corona, was found on the Rock by Clusius, but never confirmed.]

[*Agave americana* L. is very extensively planted, and has become so well naturalised here and there on the Rock and in Spain as almost to deserve inclusion.]

DIOSCOREACEÆ.

Tamus communis L. Bushy and wooded places; rather frequent; 2–5. I.! III. i. and ii.! Common in the mountains!

SMILACEÆ.

Smilax aspera L. Bushy ground; frequent? 9–1. I have never seen the type, which has red fruit (*S. rubra* Willd.?), but Debeaux says it is common. The leaves seem to vary too indefinitely to afford specific characters. I. *K.*, *D.* III. *K.*, *D.*

Var. *mauritanica* G. & G., with black fruit, is common. The fruit in all I have seen is smaller and in larger clusters than in the common species of the Italian Riviera, though by description it should be larger than in the type. The forms require elucidation. I.! III.!

Var. *vespertilionis* Boiss. has large leaves, much broader than long, deeply cordate. A robust form, climbing tall trees. III. ii. Top of Waterfall Valley! Seen elsewhere, but no stations noted.

Ruscus aculeatus L. Woods; locally frequent; 2–4. [I. Alameda (Balestrino !, labelled *R. Hypophyllum*). Not native, I think.] III. i. Near San Roque Station ! Queen of Spain's Chair ! Cork Woods, especially near Almoraima ! ii. Waterfall Valley !

†*R. Hypophyllum* L. Woods and crevices of rocks; locally common; 12–4. Floral bracts small, subulate. I. ! III. ii. Mountains !

†*R. Hypoglossum* L. Similar places; rare; 2–4. Floral bracts large, foliaceous. I. *Winkl.* III. ii. S. de Palma, *Rev.*

Asparagus acutifolius L. Bushy places and woods; 8–9. Subclimbing, phyllodes dark green, fascicled, 1½–3 lines long, flowers 1–2. I. South and west, *K.*, *D.* III. i. About San Roque and S. Carbonera, *D.* Almoraima Soto ! ? a very long-spined form.

A. aphyllus L. Bushy places and open fields; frequent; 3–5. Erect, phyllodes stout, solitary, rarely fascicled, 1 in. or more long. Flowers one or several. III. ! I have noticed this scattered all over the country, but never in flower or fruit, so made no records.

Var. *stipularis* Baker (*A. horridus* L.) has stouter, very long phyllaries, often 2–3 in. long. III. ii. Algeciras, *Née.*

A. albus L. Similar places; very common on Rock, occasional in Spain; 9–11. Phyllodes soft, pale green, fascicled, flowers several, fruit coral-red when ripe, not black as described. I. ! III. i. Puente Mayorga ! Carteian Hills ! ii. Miel Valley ! Near Palmones Pinar ! Carnero Hills ! iii. Guadacorte ! Salt Pans !

[*A. officinalis* L., reported by Kelaart as all but wild on the Rock, has been recorded by no other collector.]

Liliaceæ.

Fritillaria lusitanica Wikstr. var. *hispanica* Baker. Rough slopes; rather rare; 3–5. I. West slopes, rare, *D.*, *K.*, *Lem.* III. i. S. Carbonera, *Rev.* ii. S. de Palma, *Rev.*, *Willk.* Willkomm's record is for *F. messanensis* Raf., which Debeaux says has been confounded with *F. hispanica.*

Var. *stenophylla* Baker is hardly distinguishable by its narrower leaves, smaller less tesselated perianth, and shorter style branches. It seems to be our commoner form. III. i. Bonel's Farm ! West slopes Chair ! Sandy places near Cork Woods, *Hurst* ! ii. Occasional mountain slopes ! iii. Fields near shore at Palmones, *Rev.*

Tulipa australis Link. (*T. Celsiana* DC.). Rough slopes, rare; 3–4. III. i. South slopes of San Roque, *Wk.* Near Almoraima, *Wk.* Common round Queen of Spain's Chair, *K.*, *D.* I formerly found this commonly above Campo Common, but have recently searched for it in vain. It may have been exterminated by cultivation.

Ornithogalum narbonense L. Sandy fields, &c., occasional; 4–5. Scarcely distinct from next and perhaps confounded with it. Perianth pure white with narrow green keel, filaments longly attenuate, scarcely half perianth. III. i. At foot of San Roque and S. Carbonera, *D.*

†*O. pyrenaicum* L. Similar places; common; 4–5. Taller, perianth with a broad green keel, filaments abruptly acuminate, nearly as long as perianth. II. A plant or two ! III. !

O. unifolium Gawl. Sandy heaths; frequent, locally abundant; 3–5. [I. *K. Fl.* p. 161.] III. i. and ii.! Reaches high up mountains.

O. umbellatum L. var. *longibracteatum* Wk. Bushy or sandy places, and in woods; common; 2–4. I. Levant! Near Monkey's Cave! Europa Flats! Above Haynes's Cave! III.! Reaches top of El Frayle ridge!

Scilla verna Huds. var. *major* Boiss. (*S. Ramburei* Boiss.). Rough slopes and heathy places; frequent, but rather local; 2–4. Taller than type, flowers many, racemose, not subcorymbose, anthers blue. I. Rock Gun! Below Signal Station! III. i. Almoraima! Second Pine Wood! ii. Algeciras, *Lem.*! Palmones Pinar and Heath! iii. Guadarranque Marshes!

S. hemisphærica Boiss. Rough slopes on Rock, and marshes in Spain; locally very common; 3–4. I. Mediterranean Steps! Governor's Cottage! North-west slopes! III.! Rare in i.!

S. monophylla Link (*S. pumila* Brot.). Woods; locally abundant; 1–4. III. i. Queen of Spain's Chair! Cork Woods! ii. Mountains!

S. autumnalis L. Sandy places; abundant; 9–10. I.! III.! Not seen in II., but I have not been there in its flowering time, and no doubt it occurs.

Urginea Scilla Steinh. (*S. maritima* L.). Rough and grassy slopes; common; 9–10. I.! III.! Rare in woods!

[*Endymion campanulatus* Wk. (*Scilla camp.* Ait.) is said by Kelaart to form large beds by the road to San Roque, but it is a sylvestral species not likely to occur there, and not confirmed.]

Uropetalum serotinum Ker. Sandy fields; rare on Rock, frequent in Spain; 3–4. The flowers are always olive-brown or greenish, but often turn quite vermilion on drying. Is this the origin of *U. fulvus* Rouy, which is described as having fulvous or orange flowers? I. Mediterranean Steps! Levant! II.! III.!

Muscari comosum Mill. Sandy and grassy fields; common; 3–4. I. Below Victoria Battery and above Alameda, *Lem.* Europa Flats, *Capt. Luck.* II.? Abundantly, *K.* From Kelaart's mention of the races I think North Front is meant, but I have seen it in neither. III.! Rare in ii.!

Simethis bicolor Kunth. Open woods and bushy hills; rather locally common; 2–5. III. i. Queen of Spain's Chair and elsewhere! ii. Mountains!

[*Aloe arborescens* Mill. is only planted.]

Asphodelus fistulosus L. Dry sandy soil, rocks, and old walls; locally frequent; 2–4. I.! North Front! II.! III. i. S. Carbonera, *D.* iii. Salt Pans!

A. microcarpus Viv. Rocky slopes, fields, and woods; very common; 1–4. Always spreading-branched, bracts pale, rather narrow, filaments papillose to middle, claws square or twice as long as broad, fruit ovoid, 5 lines long by 4 lines wide, central keel as prominent as angles. I.! III.!

†*A. serotinus* W.-Dod in Journ. Bot. 1914, p. 13. Woods and

rocky slopes; locally common; 5–6. Habit of last, but rather more slender and glaucous, often taller, bracts broad, fruit small, much narrowed in lower third, 3 lines long by 2½ wide. Flowers much later. III. i. From Alcadeza Crags near Second Pine Wood to Boca de Leon!

A. cerasiferus J. Gay. Similar places; locally very common; 2–4. Rarely branched, spike very dense, bracts broad, pale, filaments smooth except claw, which is four times as long as broad, fruit depressed globose, umbilicate at base, 7 lines long by 8 wide, valves thick, central ridge faint. III. ii. Mountains!

†Var. *albus* Baker. Similar places; local; 2–4. Doubtfully distinct, occasionally with a long erect branch or two, bracts very dark, fruit globose, not umbilicate, 5 lines long by 6 wide. I. About Levant! III. ii. Occasional with type!

Allium paniculatum L. var. *pallens* G. & G. Sandy and stony places; occasional; 5–7. Stamens simple, perianth segments truncate, pale, with green or olive band, often turning rosy on drying. The type (not recorded) has rose flowers. I. Old walls, *Rev.*, *K.*, *D.* III. i. About San Roque and S. Carbonera, *D.* By Lajo! Alcadeza Crags! Path to Malaga Gardens! ii. Near Cortijo Trinidad! iii. Behind Palmones Village!

†*A. sphærocephalum* L. Sandy ground; rare; 6–7. Leaves semicylindrical, heads small, compact, flowers deep crimson, ovoid, petals connivent at tips, anthers exserted, middle cusp as long as lateral, and half as long as claw, auxiliary bulbs often some way above main bulb. I. Catalan Bay! Levant! III. i. Rail beyond Almoraima!

†*A. rubro-vittatum* Boiss. & Heldr. Rocky places; rare; 6. Slender, 4–6 in., bulb small, leaves semicylindrical, flowers white with red band. III. ii. S. de Palma, *Rev.*

A. Ampeloprasum L. Stony ground; occasional; 5–6. Stout, bulb large, with many small bulblets, leaves flat, flowers white in type. III. i. Between S. Lorca and Alcadeza Crags! Almoraima Soto, a field full! ii. Railside beyond Algeciras! iii. Salt Pans!

†Var. *atropurpureum* Regel has dingy purplish flowers, locally common. I.!

A. roseum L. Rough bushy places; rather frequent on Rock, occasional in Spain. Flowers large, pale pink, few, in a loose umbel. I.! III. i. Almoraima! Alcadeza Plains! ii. Railside near Algeciras! M. de la Torre! Carnero Hills!

A. neapolitanum Cyr. Fields and hedges; rare; 3–4. Like last, but perianth more spreading, pure white, stem trigonous. [I., *K.* Kelaart was uncertain as to the name.] III. i. San Roque, *D.*

†*A. nigrum* L. Fields and grassy places; occasional; 4–5. Stout, heads dense, flowers dingy pink, perianth stellately spreading. III.! Very common north of San Roque!

†*A. Moly* L. var. *stramineum* W.-Dod (*A. stramineum* Boiss. & Reut.). Mountain slopes; locally frequent; 4–5. Flowers large,

yellow, in a lax umbel. Leaves narrower and flowers paler than in type. III. ii. Mountains!

A. Chamæmoly L. Marshy places; very local; 11–2. Very dwarf, flowers white, leaves long, flat, spreading. III. ii. By railway near Algeciras!

A. subvillosum Salzm. Sandy ground; rare; 1–2. Like last, but much taller, leaves densely ciliate. III., *Née, Navarro.* ii. Lane at Palmones Playazo!

A. triquetrum L. Bushy places; very common; 2–4. I.! III.!

[*A. vineale* L. and *A. ursinum* L. reported to Kelaart from the Rock have never been confirmed.]

**Nothoscordum fragrans* Kunth. Sandy places; occasional; 4–6. Flowers creamy white, with a red band; no alliaceous odour. I. Bruce's Farm! III. i. Campamento Village! ii. Palmones Playazo!

COLCHICACEÆ.

Colchicum Bivonæ Guss. (*C. autumnale* L. var. *gibraltaricum* Kel.). Rough slopes; locally frequent or common? 9–10. I. Middle and upper slopes! III. i. Behind Campo Cemetery!

JUNCACEÆ.

Juncus acutus L. Sandy or muddy ground, chiefly near sea; common; 3–5. Very pungent and rigid, heads terminal, dense, capsules very large. I., *Ayala.* By Sentry Fence! II.! III.! Malaga Gardens!

J. maritimus Lamk. Similar places; locally abundant; 5–7. Tall and rigid, heads terminal, much laxer and longer, capsule smaller. III. i. Linea, *K.* ii. Palmones Playazo! About Algeciras! iii. Salt Pans! Aguacorte!

J. subulatus Forsk. (*J. multiflorus* Desf.). Muddy places near sea; locally common; 5–7. Leaves not septate, inflorescence lax, flowers not in clusters. III. ii. Behind Sandy Bay! Near Reina Cristina Hotel! iii. By Railway! Tidal Rivers! Salt Pans!

Var. or sp. aff. My 2200, with short capitate inflorescence, from marsh near Algeciras, may be a new species allied to this!

J. Tenageia L. fil. Marshy and sandy places; locally common; 4–5. Annual, slender, inflorescence very lax, capsules small, subglobose, dark brown. III. i. Hills near San Roque, *Ball*! ii. Marshes in Waterfall Valley! iii. Palmones Sands!

J. bufonius L. Damp roadsides, streams, &c., very common; 4–5; III.!

Var. *fasciculatus* Koch, with two or more flowers in a cluster, is commoner than type. II. Rare, *K.* III.!

†*J. foliosus* Desf. Similar places; rare? 4–5. Leaves more numerous, broader, 1 line or more, sepals with two black lines on back. III. ii. Marsh south of Waterfall Valley, and in a valley a mile north of it!

J. glaucus Ehrh. By streams; occasional; 5–7. Wiry, stems leafless, inflorescence lateral, basal sheaths very shining, dark brown. III. i. By Lajo! Almoraima Soto! ii. Below El Cobre! Near Las Corzas! Carnero Hills! iii. Salt Pans!

J. effusus L. Similar places; rare; 5–8. Habit of last, but soft, stems finely striate, flowers greenish, usually in a diffuse panicle, capsule not mucronate below style. III. ii. At and beyond Waterfall!

Var. *compactus* Hoppe has dense compact inflorescence. III. ii. Below El Cobre!

J. conglomeratus L. Similar places; rare; 5–8. Near last, but stem finely striate and rugulose, inflorescence dark, compact, and capsule mucronate below style. III. ii. Below El Cobre!

J. obtusiflorus Ehrh. Marshes and by streams; frequent, locally abundant; 5–6. Stem leafy, leaves septate, inflorescence with very divaricate branches, perianth segments whitish, all obtuse. III. i. By the Cagancha! Near First Venta! By Lajo! Cork Wood Sotos! ii. Palmones Playazo! iii. Guadacorte Marshes!

†*J. sylvaticus* Reichb. fil. Similar places; rare? 6. Leaves septate, panicle branches ascending, perianth segments all very acute, pale. III. ii. Near Waterfall!

†Var. *confertus* Lge. has heads more compact. III. ii. Valley above Waterfall!

J. lamprocarpus Ehrh. Similar places; occasional or frequent; 5–7. Like last, but branches ascending, perianth segments very dark, outer acute, inner obtuse. I believe more general than my records show. III. i. Lajo below First Pine Wood! ii. By Lobo behind Sandy Bay!

J. striatus Schousb. Similar places and in fields; rather common; 5–7. Stems subsolitary, short, leaves septate, much compressed and striate, inflorescence blackish. Like last, but all perianth segments acuminate, with spreading tips. II.! III.!

J. Fontanesii J. Gay. Marshy places; occasional or frequent? 5–7. Habit of last, but usually in larger patches, less leafy, perianth green or reddish, with long acuminate tips. III. i. By Lajo! Marsh near Second Venta! Seen, I think, in several other places, but no records kept.

†*J. supinus* Moench. Similar places; locally frequent; 6–8. Dwarf, cæspitose, leaves filiform, septate, heads small. Very variable in habit. III. ii. Waterfall Valley!

†Var. *uliginosus* Roth. is a lax procumbent rooting form. III. ii. With type!

†*J. pygmæus* Rich. Sandy ground; very rare; 4–5. Annual, very small, stem-leaves 1–3, glomerules several, perianth segments green, adpressed. II.!

†*J. capitatus* Weig. Similar places; occasional or frequent; 4–5. Dwarf annual, stems leafless, glomerules solitary, perianth segments dark, tips spreading, very acute. III. i. Bonel's Farm! Near Punta Mala! Almoraima, *P. L.* ii. Near Algeciras, *Nilss.* S. de Palma, *Rev.*

†*Luzula Forsteri* DC. Woods; locally frequent; 2–3. III. i. First Pine Wood! Cork Woods! ii. M. de la Torre! Mountains!

CYPERACEÆ.

Cyperus capitatus Vand. (*C. schœnoides* Griseb., *Schœnus mucronatus* L.). Sand-dunes; locally common; 4–6. I. Catalan Bay! North Front! II.! III. i. Linea! ii. Sandy Bay! Palmones Playazo! iii. Palmones Sands!

C. rotundus L. (*C. olivaris* Targ.-Tozz.). Roadsides and waste places; rather frequent; 4–12. I. Below Lunatic Asylum! North Front! In the town, *K.* II. *K.*, *D.* III. ii. Algeciras Station and south of the town! iii. Sands by Palmones River, *Boiss.*, *Wk.* Salt Pans! Guadacorte!

**C. esculentus* L. Similar places; rare? 7–9. Taller, spikelets paler, shorter, distichously set. III. ii. Sea sand by Palmones River and Algeciras, *Rev.*

C. longus L. Wet places; type rare; 3–8. III. i. Almoraima Soto! A form with few, small, pale spikelets.

Var. *badius* C. B. Clarke. A tall stout plant, very common. II.! III.!

†*Pycreus Mundtii* Nees (*Cyperus Eragrostis* Wk. non Vahl., *C. turfosus* Salzm., *C. pallescens* Deb. non Desf.). Marshes; rare; 5–7. Short, leafy, leaves shorter than stem, the involucral shorter than rays, rays 4–5 long and 2–3 subsessile, spikelets rather dark, lanceolate. III. i. Alcadeza Crags! Soto Gordo! ii. Salt marsh near Algeciras, *Rev.*!, erroneously named *Cyperus pallescens* Desf. iii. Near Palmones, *Rev.*, probably this.

P. flavescens L. (*Cyperus Gussonei* Gasp.). Marshes; rare? 5–7. Annual, tufted, short, slender, spikelets pale, subcapitate. III. ii. Algeciras, *Rev.*

P. globosus Reichb. Damp sandy places; very rare; 6–8. Heads dense, globose, whitish. III. i. A single clump near ford between San Roque and Pinar de los Bigotes!

Eleocharis palustris R. Br. Pools and wet places; common; 3–6. II.! III.!

†*E. multicaulis* Sm. Damp heathy spots; occasional or locally frequent; 3–6. III. i. Queen of Spain's Chair! ii. Waterfall Valley!

Schœnus nigricans L. Similar places; locally common; 2–5. III. i. Foot of Chair both sides! Arroyo Viejo! Alcadeza Plains! ii. By Miel! Beyond Carnero Point!

Scirpus cernuus Vahl. (*S. Savii* Seb. & Maur.). Streams and wet places; rather frequent; 3–7. III. i. Cork Wood Sotos! ii. Palmones Pinar and Playazo! Mountains! iii. Salt Pans! Guadacorte Marshes!

Var. *Vahlii* Lge. has larger solitary heads, with shorter bracts. III. ii. Near Algeciras, *Fritze.*

S. lacustris L. Marshes; locally plentiful; 4–7. III. i. Between Almoraima and Long Stables! iii. Guadacorte Marshes!

S. sp. Pools; very local; 5–7. Stems very tall, pale, subcylindrical, inflorescence diffuse, branches 7–8, very unequal, each with 3–8 unequally pedicelled heads, umbellately set, 2½–3 lines long. Near *S. littorale* Schrad., but stem not triquetrous. Probably a new species, but my specimens are too young to describe fully. III. i. Campo Common!

S. Holoschœnus L. Sandy places; very common; 4–6. II.! III.!

Var. *australis* Koch has smaller fewer heads, and grows with the type. III.!

S. maritimus L. Pools and ditches, and by rivers; very common; 3–6. II.! III.!

Var. *compactus* Reichb. fil. is a form with sessile heads, hardly worth distinguishing. It grows frequently with type. II.! III.!

†*Fuirena pubescens* Kunth. By streams; rather rare; 5–6. III. i. East slopes Chair! ii. Waterfall Valley! Slopes towards El Saladillo! S. de Palma in Los Barrios district, *Rev.*

†*Rynchospora glauca* Vahl var. *pauciseta* Turrill in Journ. Bot. 1914, p. 14. Wet places; very local; 6. Cæspitose, with lax elongate inflorescence, on very long flaccid stems. An acquisition to the Flora of Europe. The variety also occurs in Algeria (sp. herb. Kew. labelled *P. laxa* R. Br.!). The type is widely spread. III. ii. Above Waterfall!

Carex divisa Huds. Sandy grassy places; frequent; 1–5. I. North Front! II.! III.! Rare north of San Roque.

C. vulpina L. Bushy places and by water; frequent or common; 3–6. II.! III.!

C. divulsa Good. Banks and bushy places; frequent; 3–5. I. Below St. Bernards. III.! Some forms look like *C. muricata* L., which is recorded from the neighbourhood by Pourret (*ex* Colm.), but I think ours is all *C. divulsa.*

†*C. paniculata* L. Swamps; locally common; 1–4. III. i. In most of the Cork Wood Sotos! Below S. Lorca!

C. distachya Desf. (*C. Linkii* Schk.). Dry bushy places; frequent? 2–4. Spikelets mostly androgynous, some female on long slender stems from base, utricles glabrous, stems 12–18 in., leaves $\frac{1}{4}$–$\frac{1}{2}$ line wide. I. Slopes below Middle Hill! Frequent on Windmill Hill!? Perhaps *C. Halleriana.* III. i. Queen of Spain's Chair! ii. Palmones Pinar! The species has been confounded with *C. ambigua*, *C. depressa*, and *C. Halleriana.* One of the four occurs in Cork Woods, Alcadeza and Herring Bone Crags, M. de la Torre, and in the Waterfall Valley!

†*C. ambigua* Link. Similar places; rare? 2–4. Like last but shorter and less erect, leaves $\frac{3}{4}$–1 line broad. III. i. Queen of Spain's Chair!

†*C. acuta* Fr. By streams; locally common; 3–4. III. ii. By Miel above Algeciras! Also, I think, in some neighbouring streams.

C. glauca Scop. Damp, usually clayey spots on hills; the type rare; 3–5. III. ii. Near upper aqueduct, Algeciras!

Var. *serrulata* Ball, with less exserted peduncles, and narrow fruit tapering at both ends, is common. III. i. and ii.!

C. pendula Huds. (*C. maxima* Scop.). Wet places in woods; locally frequent; 4–5. III. i. Cork Wood Sotos! ii. Mountains! Hills near Carnero Point!

C. hispida Willd. Damp places; frequent; 4–5. III.!

Var. *anacantha* G. & G. has very acute but hardly acuminate glumes. III. iii. Guadacorte Marshes! (1399).

†*C. depressa* Link (*C. basilaris* Jord.). Dry bushy places; rather rare; 2–4. Resembles *C. ambigua*, but spikelets all unisexual, and utricles slightly pubescent. III. i. Queen of Spain's Chair! ii. Hills above Algeciras, *Ball*. There is a specimen from Algeciras at Kew without collector's name!

C. Halleriana Ass. Similar places; rather rare; 2–4. Like last, but taller and more slender, with pubescent utricles. I. Mediterranean Road! III. i. Queen of Spain's Chair!

C. distans L. Marshy places; very common; 4–6. III.! C. B. Clarke unites this with *C. Hornschuchiana* Hoppe, which I think also occurs.

Var. *bætica* Auers. has green, not fuscous, glumes. III. i. About San Roque and Gibraltar, *Wk*. ii. S. de Palma, *Rev*.

†*C. binervis* Sm. Similar places; occasional; 3–6. Like last, but utricles with two strong green lateral ribs. III. i. Almoraima Soto! ii. S. de Luna, *Nilss*. iii. Guadacorte!

†*C. punctata* Gaud. Marshes; rare; 2–4. III. i. Soto Gordo!

†*C. extensa* Good. Marshes near sea; locally common; 4–6. III. ii. Palmones Playazo! iii. Palmones Marshes, a form with very remote lower spikelets!

†*C. lævigata* Sm. Damp woods and by streams; locally frequent; 3–5. III. i. Almoraima and other Sotos! ii. Mountains to top of El Frayle Ridge. Near Pelayo!

GRAMINEÆ.

†*Leersia hexandra* Sw. Swamps; rare; 6–7. III. i. Spring above Pindalista! ii.? Near Algeciras, *Rev*. Probably same station as next. iii. Guadacorte Marshes!

Phalaris brachystachys Link. Cornfields; very common in Spain; 4–6. Annual, spikes about twice as long as broad, both scales below florets very short. I. Above Alameda! III.! Probably the species recorded by Masson as *P. canariensis* L.

P. minor Retz. Dry waste places; probably common; 4–6. Like last, but spikes longer, one scale below florets one-third length of pale. I. Reclamation Road! Near Willis's! III.!

P. paradoxa L. Cornfields; rather frequent; 4–6. Spikes usually half enclosed in upper sheaths, some or all spikelets aborted and indurated. III.!

P. cærulescens Desf. (*P. bulbosa* Cav. non L.). Damp clayey spots; common; 4–6. Tall, perennial, with bulbous root. III.!

Var. *major* Wk. (sub *P. bulbosa*) is the taller form, often 4 ft. or more!

Anthoxanthum ovatum Lag. Dry fields; abundant and very variable; 4–5. III.!

†*Phleum pratense* L. Dry fields; rare; 4–6. I. *K*. III. i. S. Carbonera, *D*.

†Var. *nodosum* Gaud. is decumbent, with swollen lower nodes

and short slender spikes. III. i. S. Carbonera, *D.* ii. North of El Cobre!

Crypsis aculeata Ait. Dry beds of pools; locally frequent? 6–8. Heads hemispherical or shortly oblong. III. iii. Excavations by railway!

Heleochloa (*Crypsis*) *schœnoides* Host. Similar places; rare; 6–8. Heads oblong or cylindrical. III. iii. Roadside excavation, Guadacorte!

Tragus racemosus Scop. Sandy and cultivated fields; rare; 4–6. III. i. Near Gibraltar, *Cabrera*, *Clem.*

Digitaria sanguinalis Scop. Cultivated soil; rare; 6. III. iii. Garden at Salt Pans!

**Paspalum Digitaria* Poir. Sandy shores; rare; 6. II. West shore!

Setaria verticillata P. de B. Cultivated soil; rare; 6–9. Awns with deflexed scabridity, setæ two. I. Alameda Gardens! and elsewhere, *D.* III. ii. Roadside near Algeciras Casino!

S. viridis P. de B. Similar places; rare; 6–7. Awns with erect scabridity, setæ several. III. i. Cultivated ground at San Roque, *D.*

Panicum repens L. Sandy ground; rather common; 5–11. I. North Front! II.! III.! A dwarf form, almost covered with sand, occurs in patches in sand dunes north of Linea!

Echinochloa Crus-Galli P. de B. Cultivated ground; frequent; 5–9. III. i. and ii.! iii.?

Andropogon distachyum L. Bushy ravines; rare; 4–9. III. i. Queen of Spain's Chair! Majarambout Crags! Alcadeza Ravine! ii. S. de Saladillo, *P. L.*

Cymbopogon (*Andropogon*) *hirtus* Stapf. Dry fields; abundant in Spain; 1–12, but chiefly 4–6. I.! III.!

Var. *longiaristatus* Wk. with awns 1 in. long or more, and sheaths glabrous below panicle, is as common as type!

†Var. *podotrichus* Hack. with spikelets longly villous above, the hairs on tubercles. III. ii. Algeciras, *Rev.*

†*Chrysopogon Gryllus* Trin. Dry places; rare; 6–7. Superficially like last, but spikelets ternate on many long slender branches from each node, in a denser panicle. I. *K.* III. i. Near Gibraltar, *Von Martius.*

Sorghum halepense Pers. Cultivated ground; occasional; 6–9. A stout broad-leaved species, with lax pyramidal panicle of subspiciform branches, leaflets with a broad white midrib. III. i. In maize fields by the Lajo! Railway near Second Venta! ii. About Algeciras aqueduct! iii. Gardens at Salt Pans!

Imperata cylindrica Pers. Grassy places; very local; 5–7. Panicle narrow, spiciform, becoming very white-silky. III. iii. Guadacorte Marsh!

Cynodon Dactylon Pers. Sandy grassy places; very common in Spain, less so on the Rock; 1–12, but chiefly 5–9. I. Scattered about lower levels! II. West shore! III.!

Spartina stricta Roth. Muddy salt marshes; local; 6–9. III. Near San Roque, *Masson*! Probably same station as next. ii. and iii. Guadarranque Marshes, both sides of river!

Arundo Donax L. Sandy places, partial to damp; common; but almost always planted for fences; 9–11. Glumes subequal, lower pale with long silky hairs below. [I. *K.*] III. In all sub-districts, but looking native only by R. Lobo!

Phragmites communis Trin. By shore and by rivers; rather frequent; 7–9. Glumes very unequal, lower pale glabrous. I. Sandy Bay! III. i. Along the shore! By the Lajo in many places. ii. By the shore! iii. Frequent by Aguacorte River and elsewhere! Often with barren shoots several yards long. *P. gigantea* J. Gay, 12–16 ft. high, is commoner in the province, and may have been confounded with it or with *Arundo Donax*. I have seen none of them in flower.

Ammophila arenaria Link. var. *arundinacea* Husnot (*Psamma australis* Mab.). Sand dunes; rather frequent; 5–6. More slender than type, with longer hairs at base of pales. II. East shore! III. i. Linea Sands! Near Campamento Common! Guadarranque! ii. Palmones Playazo! Sandy Bay! iii. Palmones Sands!

Agrostis Juressi Link. Grassy places; rare; 6. Aspect of *A. verticillata* but annual, panicle contracted, subinterrupted, branches naked in lower part, pales unequal, the lower as long as glumes. III. ii. S. de Palma, *Rev.* By the Miel above and below Waterfall!

A. Reuteri Boiss. Similar places; rare; 6–8. Perennial, panicle always very lax and slender. III. i. Campamento Common, behind Fernando's!

A. alba Schrad. Dry grassy places; occasional; 5–6. Perennial, leaves flat, panicle lax or narrow. III. i. About Campamento and San Roque!

Var. *gigantea* Mey. is a large form with larger laxer panicle. III. i. By the Cagancha in several places! Stream near Second Venta!

†Var. *fuscescens* Hack. has lanceolate acute glumes, becoming brown at maturity. III. ii. Algeciras, *Rev.*

†Var. *myriostachys* Hack. resembles *A. Reuteri*, glumes linear-lanceolate, deep brown. III. ii. Algeciras, *Rev.*

[Var. *densiflora* Parl. (*A. scabriglumis* B. & R.) is said to be frequent in the province.]

A. verticillata Vill. By streams; locally rather frequent; 5–8. Perennial, panicle dense, usually narrow, branches flowering to base, pales equal, shorter than glumes. III. i. Well in Linea! By Almoraima Station, with rather lax panicle! ii. Below Palmones New Bridge, a very large form! Above Waterfall, and elsewhere in the mountains!

A. castellana B. & R. Dry hill slopes; the type rare; 5–6. Like *A. alba*, but lower pale with two minute lateral awns, and, in the type, a dorsal awn. III. i. Near San Roque, *Ball*!

Var. *mutica* Hack. has lower pale awnless, and is the usual form. III. i. Queen of Spain's Chair! mixed with type. First Pine Wood! Campamento Common! ii. Waterfall Valley!

Var. *tricuspidata* Hack. is a form of the above. III. ii. Various places about Algeciras, *Rev.*

A. setacea Curt. Dry hill slopes; locally common; 5–8. Leaves quite setaceous. III. i. Summit of Chair! ii. Plentiful on slopes beyond the Waterfall!

A. pallida DC. Dry places; abundant; 5–6. Annual, with very lax pale green panicle, and only one pale. III.! A specimen from Porta & Rigo is labelled *A. Cupaniana.*

A. interrupta L. Sandy places; rare; 6–7. Annual, with narrow interrupted panicle, and very long awns. I.? *Clem.* Perhaps not on the Rock.

Sporobolus pungens Kunth. Sandy places near sea; rare? 7–9. Stem with many distichously set stiff leaves, one fertile flower. I.!? II.!? III. i. Linea, *D.* ii. Algeciras, *D.* iii. Palmones, *D.* Flowers too late for my observations, but I have seen leaves apparently of this species at the Lighthouse, on the Neutral Ground, and at the mouth of Palmones River. There may be confusion with *Æluropus* when not in flower, but inflorescence very different.

Gastridium lendigerum P. de B. Very common in cornfields, occasional in woods; 5–7. I. *K.*, *Boiss.* III.!

Polypogon monspeliensis Desf. Damp and waste places; very common; 4–7. I.! II.! III.!

P. maritimus Willd. Similar places; frequent; 4–7. Usually smaller and reddish, glumes rather deeply bilobed. I. By Sentry Fence! Queen's Road, at 700 ft.! II.! III. i. Campamento Common! ii. Carnero Hills! Estuary by Reina Cristina, Algeciras! iii. Palmones Sands and Marshes!

Chæturus fasciculatus Link. Dry open places; locally common; 4–5. III. i. All round foot of Chair! iii. Guadacorte Marshes!

Lagurus ovatus L. Sandy, waste and gravelly places; very common; 4–6. I.! II.! III.!

Stipa tortilis Desf. Dry open hills; rather frequent; 4–5. I. Mediterranean Road, &c.! Europa Flats! Buena Vista! III. i. Cork Wood and Alcadeza Crags! Both sides First Pine Wood! Campamento Common! ii. Hills near Cortijo Trinidad! iii. Sands at Palmones, *Rev.*

Macrochloa tenacissima Kunth. Dry bushy hills and woods; local; 4–6. I. Abundant by Charles V.'s Wall and above Levant! occasional elsewhere! III. i. Cork Wood Crags! S. Carbonera! San Roque, *Masson.*

M. arenaria Kunth. Similar places; occasional; 4–5. III. i. East slopes Chair! Cork Woods! Alcadeza Crags! ii. Waterfall Valley!

Piptatherum cærulescens P. de B. Dry bushy slopes; very common on Rock, less so in Spain; 4–6. Ligule long, branches of panicle few, spikelets 3½–4 lines, awn of pales not longer than glumes. I.! III. i. and ii.!

P. miliaceum Coss. (*P. multiflorum* P. de B.). Similar places; common; 5–6. Ligule short, branches of panicle many, spikelets 1½–2 lines, awn of pales about twice glumes. I.! III.!

†Var. *Thomasii* (Kunth) has many of the lower panicle branches devoid of spikelets, but runs into type. I. Here and there mixed with type! III. ii. The prevailing form in the Waterfall Valley!

Airopsis globosa Desv. Sandy hills; rather rare? 4–5. Spikelets small, very globose. III. i. Between Pinar del Rey and Jimena, *Porta & Rigo*! perhaps beyond our limits. iii. Between Algeciras and San Roque, *Winkl.*

†*Antinoria agrostidea* Parl. Sandy turfy fields; locally abundant; 3–4. A short cæspitose perennial, spikelets small and short, one floret sessile, the other stipitate, glumes dark, longer than florets. III. ii. Pastures near El Cobre! iii. Los Barrios Aviation Ground! I believe also in i., but no definite record.

Molineria minuta Parl. Similar places; rare? 3–4. Annual, panicle very lax, lower pale many-nerved, keeled, glumes shorter than florets. III. i. Gibraltar, *Cabrera*, *Clem.* Doubtless the neighbourhood is meant. Pinar del Rey, *Porta & Rigo*! labelled *Aira lendigera* Lag. var. *mutica* Boiss.

Var. *bætica* Wk., with hairs at base of lower pale as long as the pale, is the commoner form in the province. III. ii. Near Algeciras, *Hack.*

†*Aira caryophyllea* L. Sandy fields and open woods; rather rare; 4–5. III. i. San Roque, *Masson*! Cork Woods above San Roque, *Boiss.*! ii. S. de Palma, *Porta & Rigo*! labelled *Periballia hispanica.*

†*A. multiculmis* Dum. Similar places; rare; 4–5. Distinguished from last by its clustered spikelets. III. i. Cork Wood Crags! form with one-awned spikelets. There are two sheets at Kew from Boissier and Reuter, one labelled *A. capillaris* Host., the other *A. multiculmis* Dum., both "Gibraltar," which belong here. They probably come from San Roque, not from the Rock.

A. elegans Gaud. Dry sandy and stony places; frequent, at least locally; 4–6. Panicle large and very lax, only one flower awned. III. ii. M. de la Torre! Plentiful in Waterfall Valley!

[Var. *biaristata* G. & G., with both florets awned, is common in the province.]

Corynephorus canescens P. de B. Sandy ground; local; 5–6. Perennial, in compact tufts, apical portion of awn gradually enlarged upwards, anthers 3–4 times as long as broad. III. i. Cork Woods near San Roque, *Boiss.* iii. Palmones Sands! (1080 and 2072).

†*C. fasciculatus* B. & R. Sandy ground; occasional; 4–5. Annual, in lax tufts, awn as last, anthers quadrate. II. *D.* III. i. Linea, *D.* Pine Woods near San Roque, *B. & R.*

C. macrantherus B. & R. Similar places; occasional; 4–5. Like last, but spikelets larger, in larger denser fascicles, apical portion of awn abruptly enlarged upwards, anthers linear. III. i. San Roque, *Boiss.* Near Soto Gordo! (2146). Almoraima, *Porta & Rigo*!

Deschampsia flexuosa Griseb. Grassy places in mountains;

rare; 6–7. III. i. Queen of Spain's Chair! ii. Mountains beyond Waterfall! (2259). Dr. Stapf has only seen the latter specimen, which he considers inseparable from type.

Var. *orophila* Hack. has a denser panicle with less spreading branches. III. ii. Summit of S. de Palma, *Rev.* Probably same station as mine.

Avena sterilis L. Dry fields and waste places; frequent; 4–6. Spikelets much larger than in next, only one floret disarticulating. I. Thinly scattered! III. i. and ii.!

[Var. *maxima* P. L., a stout form, and var. *scabriuscula* P. L., a more slender one, with lower part of awn scabrid, not villous, are said to be as common as type in province.]

A. barbata Brot. Similar places; common; 4–6. All florets disarticulating. I.! III. i. and ii.!

A. sulcata J. Gay. Rough bushy places; rare; 4–6. Lower pale with 5–7 strong nerves, glabrous, with a tuft of hairs at base as long as pale. III. ii. S. de Luna, *Winkl.*

A. albinervis Boiss. Similar places; locally frequent; 4–6. Lower pale much less strongly nerved, hairy in lower third. III. i. Queen of Spain's Chair! Majarambout Crags! Almoraima, *Porta & Rigo*! labelled *A. bromoides* var. *microstachya* Wk. ii. Slopes beyond Waterfall!

A. bromoides Gouan. Similar places; rare; 5–6. I. Mediterranean Steps! Willis's!

†*Arrhenatherum elatius* M. & K. Dry bushy places and woods; frequent? 5–6. III. i. Near San Roque, *Brouss.* ii. Near Algeciras, *Rev.* iii. At Palmones, *Rev.* Perez Lara has not seen this or the variety in the province, and suspects that the next species may have been mistaken for it.

†Var. *bulbosum* Gaud. differs only in the base being swollen into one or more superposed bulbs, and is the only form I have seen. III. i. Queen of Spain's Chair, frequent! ii. About the Waterfall!? Perhaps *A. pallens* has been mistaken for it in the last station.

A. erianthum B. & R. Similar places; rare, but common elsewhere in the province; 4–6. Differs from last in larger spikelets, awn produced from base instead of from middle of pale, and perfect floret longly hirsute all over except at apex. III. ii. Below Waterfall!

†*A. pallens* Link. (*A. Thorei* Duby). Similar places; local; 5–6. Spikelets smaller, both florets usually fertile, awn above middle of pale. III. ii. Mountains above Algeciras, *B. & R.*! Waterfall Valley! S. de Palma, *Winkl.*

Trisetum Dufourei B. & R. Sandy fields and woods; occasional; 4–5. Ligule a ring of hairs, spikelets 2-flowered, awn 2–3 times as long as setæ of pale. III. i. Sandy woods near San Roque, *B. & R.*! Cork Woods! ii. Palmones Pinar! (959 and 1907). Probably Reverchon's "near Palmones River." iii. Lane from Guadarranque to Guadacorte!

Var. *lasianthum* P. L. has a very short lacerate ligule, not reduced to hairs, larger 3-flowered awnless spikelets, and more villous very acute glumes. III. i.? Near Gibraltar, *Boiss.* ii. Near Algeciras, *Hack.* Palmones Pinar! (937).

Koeleria panicea Domin (*Trisetum neglectum* Kunth). Sandy and grassy places; very common; 4–6. Sheaths villous, panicle 1½–4 in. Looking like a lobed *Polypogon.* I.! II.! III.!

†*K. pumila* Domin (*T. pumilum* Kunth). Similar places; much less common; 5–6. Sheaths puberulous, panicle spiciform, ½–1 in., awn shorter than in last. I. Above Willis's! (1049). III. Probably common, but confounded with last.

K. phleoides Pers. Grassy and gravelly places; very common on Rock, rare in Spain; 4–5. I.! III. i. By Lajo below Almendral! iii. Guadacorte! Palmones, *Rev.*

†Var. *brachystachya* Domin is a dwarf form. I. Gibraltar, *Von Martius.* I think common on gravel paths, as on Queen's Road near Michael's!

†*K. Salzmanni* B. & R. var. *valdepilosa* Domin (*K. phleoides* var. Hack.). Sandy ground; very local; 5. III. ii. Palmones Pinar! (939). Probably Reverchon's "Palmones" station.

†*Holcus grandiflorus* B. & R. Bushy places in open woods; locally common; 5–6. III. ii. Slopes above and below Waterfall!

H. lanatus L. Grassy places; common; 5–8. Not creeping, awn hooked at tip, scarcely exserted. II.! III.!

Var. *argenteus* Hack. non Lge., less puberulent, often subglabrous, is as common and probably the prevailing form. III. i. San Roque, *Boiss.* ii. Waterfall Valley!

†Var. *tuberosus* Ball. Rhizome subtuberous. III. i. San Roque, *Ball.*

H. mollis L. Similar places; rare; 5–8. Stoloniferous, awn straightish or curved, longly exserted. III. i. Near San Roque, *Brouss.* ii. Marshy spot in valley beyond Waterfall!

Glyceria fluitans R. Br. Wet ditches; occasional; 4–6. III. i. Lajo Valley! Almoraima Station! ii. Roadside at Algeciras Bull ring! Gardens at Palmones Pinar! ii. Gardens at Salt Pans! Seen elsewhere, but no precise stations noted.

[Var. *plicata* Griseb., with shorter spikelets and florets, is frequent in the province.]

†*G. loliacea* Godr. Similar or drier places; rare; 4–6. Resembles *L. perenne.* III. i. Near Gibraltar, *Amo.*

†*Atropis iberica* W.-Dod in Journ. Bot. 1914, p. 14. Tidal rivers; locally common; 5-6. III. ii. and iii. Palmones River, both sides, about the bridges!

A. sp. My 1069 from the salt marshes near the stone bridge in Guadarranque Marshes is probably a new species allied to *A. festucæformis* Richt. The material is not sufficient to diagnose.

†*Schismus marginatus* P. de B. (*Festuca calycina* L.). Sandy places; rare; 4-6. I. *K.* III. i. Near Gibraltar, *Von Martius.*

Poa annua L. Grassy places, roadsides, &c.; very common; 1–12. I.! II.! III.!

P. bulbosa L. Similar places; occasional; 3–5. Perennial, with a bulbous root and glaucous foliage. III. i. Queen of Spain's

Chair! Campamento Common! Pine Wood Plains! ii. Hills south of Algeciras! Mountains behind Saladillo!

P. trivialis L. Damp and clayey places; common; 4–6. II.! III.!

Briza minor L. Grassy places; very common in Spain; 5–6. I.? *K.* No confirmation. III.!

B. maxima L. Similar places; very common in Spain, frequent on the Rock; 5–6. I.! III.!

Melica minuta L. (*M. aspera* Desf.). Rocky and stony places; common on the Rock, less so in Spain; 4–6. The type is usually short, up to 12 in., with rather small subsimple panicle, and involute leaves, but it varies greatly. I.! III. i. Queen of Spain's Chair! ii. Carnero Hills! Waterfall Valley!

Var. *arrecta* (Kunze) has more erect panicle branches, and more unequal glumes, the outer longer than the florets. I. East slopes among *Chamærops*, *Wk.*! Middle Hill! (483).

Var. *latifolia* Coss. (*M. major* Sibth. & Sm.) is much taller, with broad flat leaves and a large panicle. It is the form of bushy places. I.! III. ii. Waterfall Valley! S. de Palma, *Rev.*

Var. *pyramidalis* (Bertol.) has a spreading pyramidal panicle. I.!

†*M. ciliata* L. Similar places; frequent on the Rock, occasional in Spain; 4–6. Panicle spiciform, lower pale longly silky. I.! III. i. San Roque, *Masson*!

Var. *major* Ball (*M. Magnolii* G. & G.) is a large form with lobate and interrupted panicle. I. Above Willis's! Probably elsewhere. III. i. West slopes Chair! ii. Carnero Hills!

[*M. nutans* L. is reported near Gibraltar by Cabrera (*ex* Colm.).]

Cutandia (*Sclerochloa*) *maritima* Benth. Sand dunes near the sea; rather local; 4–6. Spikelets and panicle branches often divaricate, pales very acute, keeled. I. Beyond Catalan Bay! II. East shore! III. iii. Palmones Sands!

Scleropoa (*Desmazeria*) *loliacea* G. & G. Roadsides and waste places; locally frequent on the Rock; 4–6. Panicle compact, with erect subsessile spikelets, pales obtuse, not keeled. I. Governor's Cottage! Catalan Bay! Glacis! III. ii. Algeciras, *Winkl.*

S. rigida Griseb. Similar places; common; 5–6. Panicle smaller, rigid, with spreading pedicellate spikelets, pales as last. I.! III. i. and ii.!

Æluropus (*Dactylis*) *littoralis* Parl. Sandy shores; occasional? 5–8. Leaves many, short, stiff, distichous, spikelets 5–11-flowered in a lobulate spiciform panicle. I. *K.* III. i. Between Gibraltar and San Roque, *D.*

†*Dactylis glomerata* L. Rough bushy places; very common; 5–7. A most variable species, of which the type has not hitherto been recorded. I.! III. i. and ii.!

Var. *australis* Wk. (*D. hispanica* Roth.) is shorter, with a denser subsimple panicle, lower pale with deeper, rounded, not acute lobes, with shorter mucro. It is as common as type. I.! At foot of Gibraltar, *Salzm.*! III. ii. Waterfall!

[Var. *juncinella* Boiss. is a smaller, more slender variety, with more puberulent, emarginate lower pale, and is, I believe, frequent.]

Danthonia decumbens DC. Chiefly in watercourses on mountains; locally frequent; 4–6. III. i. Queen of Spain's Chair! ii. Frequent in mountains!

Molinia cærulea Moench. Watercourses; local; 7–8. III. i. North-east slopes Chair! ii. Valley beyond Waterfall!

Cynosurus echinatus L. Bushy slopes; common; 5–6. I.! III.!

C. elegans Desf. Similar places; very local; 5–6. III. ii. At the Waterfall!

Lamarckia aurea Moench. Roadsides, walls, and waste places; rather frequent; 3–5. I. Walls in the town! Dockyard! Engineer Road! III. i. Campamento village! ii. Walls in Algeciras! iii. Palmones village!

Vulpia Myurus Gmel. Grassy and rough places; frequent? 4–5. Leafy to top, panicle long and narrow, upper glume not awned. III. i. and ii.!

V. sciuroides Gmel. Similar places; common; 4–5. Stem longly naked at top, panicle short, dense. Not always easily distinguishable from last. III. i. and ii.!

Var. *longearistata* Wk. (*V. Broteri* B. & R.) has more numerous florets, and a longer awn to lower glumes. III. i. Almoraima, *Boiss.* San Roque, *D.* ii. S. de Palma, *Rev.*

V. ciliata Link. Sandy places; rare? 4–5. Panicle long and narrow, silky-villous, partly enclosed in uppermost sheath, pedicels very short, lower glume not more than one-fifth as long as upper, pales longly ciliate. I. *K.* II. On the Isthmus, *Wk.*! III. i. S. Carbonera, *D.* Almoraima, *Wk.*

V. uniglumis Dum. Similar places; rare (but abundant in the province *P. L.*); 4–5. Both glumes awned, the lower one-tenth as long as upper or less. Habit of *Bromus madritensis*. III. i. Near Gibraltar, *Von Martius.*

V. geniculata Link. Stony and rough places; very common; 4–5. Very variable, I have seen it 4ft. high by the Lajo. I.! *Masson*! III.!

†Var. *conferta* Coss. & Germ. is a dwarf condensed form. I. Europa Flats!

V. Alopecurus Link. Sandy ground; very common; 4–5. Spikelets on shorter pedicels, larger, and with more numerous florets than in last. I. Cave Guard, *K.* II.! III.! Near Gibraltar, *Salzm*! *Masson*!

Var. *lanata* Boiss. with subsimple raceme and very silky-villous pales seems as frequent as type. II.! III.!

†Var. *sylvatica* Boiss. has elongate strict raceme, spikelets with 7–9 florets, and awn twice as long as pale. III. i. Cork Woods above San Roque, *Boiss.* I believe I have gathered this by the Lajo below Second Pine Wood.

Festuca ampla Hack. Grassy hills; rare; 5–6. Cæspitose, slender, leaves flaccid, setaceous, convolute. III. i. Queen of

Spain's Chair! (2157). Found there also by Reuter, *teste* Hackel.

†*F. montana* M. Bieb. var. *altissima* Hack. (*F. exaltata* Wk. non Presl.). Stony slopes; very local; 6–7. A very large and tall species. III. ii. At and above Waterfall! Hackel and Reverchon have also found it there.

F. cærulescens Desf. Stony and bushy slopes; locally common; 4–6. Stem-leaves flat, the radical often setaceous, densely covered at base of stem with remains of old sheaths. III. i. S. Carbonera, *Hack.* Majarambout Woods! ii. Plentiful slopes beyond Waterfall!

F. arundinacea Schreb. var. *mediterranea* Hack. Damp clayey spots; frequent; 4–6. Awn frequently not terminal. I. Europa Glacis, on dry rocks, rare! III. i. Marshy ground near Pindalista! (1195). iii. By Los Barrios Station! (2064). Seen in many other places, but doubtful between this variety and next.

Var. *Fenas* Hack. (*F. interrupta* Desf.) is probably as frequent as last. III. i. Lajo Valley near upper ford! Gibraltar, *Fritze.* Almost certainly in this subdistrict.

Bromus tectorum L.? Rocky slopes; rare or error; 4–6. Panicle drooping, rather dense, spikelets smooth, awn about as long as pales. I.? *D.* Not confirmed.

B. sterilis L. Rough grassy places; occasional? 4–6. Very like *B. maximus* var. *Gussonei*, but decidedly smaller, with shorter awns. I. Reclamation Road! Charles V.'s Wall! and probably elsewhere. III. ii. El Cobre! Doubtless much more frequent than these records show.

B. maximus Desf. Sandy ground; common; 3–5. The type has pale green very shortly pedicelled spikelets, with very long awns. Either this or the next species is common, but their differences are obscure, and the two have been much confused. I.! Specimens from Catalan Bay (884 and 1157) have fascicled bulbs at the roots, but Dr. Stapf thinks they are only a state of the type. III.!

Var. *Gussonei* Parl. is much more diffuse and lax, resembling *B. sterilis.* It appears to be the commoner form, at least in Spain. III.!

†Var. *glaber* Wk. is a dwarf, few-flowered variety, with glabrous and shining spikelets. III. i. Near Gibraltar, *Wk.*

B. madritensis Desf. Similar places; frequent? 3–5. Smaller than last with shorter awns, spikelets usually purple. I. *Brouss*! Willis's Road! III. No actual records, but it certainly occurs, and is abundant in the province.

Var. *ciliatus* Guss. has a dense subthyrsoid panicle, with softly pubescent, not scabrid glumes. I. Catalan Bay!

B. rubens L. Similar places; occasional; 3–5. Panicle denser, rigid, reddish, spikelets subsessile. I. South and west slopes, *K.*, *D.* III. i. San Roque, *Boiss.*

†*Serrafalcus commutatus* Godr. Grassy places, partial to shade; occasional or frequent; 4–6. Panicle large and lax, often drooping, pedicels long. III. i. Almoraima Soto! ii. Hills south of Alge-

ciras! iii. Guadacorte Marshes! and probably many other places.

S. hordeaceus G. & G. (*S. mollis* Parl.). Grassy places; very common in Spain, occasional on the Rock; 4–6. I. Above Alameda! Buena Vista! By North Front Cemetery! II.! III.!

Var. *leiostachys* M. & K. is a glabrous form. III. iii. Palmones Marshes!

Var. *contractus* Lge.? has a compact panicle with short pedicels. III. i. Pedrera!

S. Cavanillesii Wk. (*Bromus scoparius* L.). Sandy ground; rare; 4–6. Panicle very dense, awns long, divaricate. III. ii. Algeciras, *Winkl.*

S. squarrosus Bab. Sandy and cultivated fields; rare; 5–6. Panicle very lax, spikelets pendulous, lanceolate, with very divaricate awns. III. i. Near San Roque, *Brouss.*

S. macrostachys Parl. Similar places; frequent; 5–6. Like last, but panicle and spikelets erect, the latter larger and broader. III.

Var. *brevispicatus* Boiss. has smaller more simple panicle. III. i. By watercourses, Campamento Common!

Hordeum murinum L. Sandy and waste places; very common; 3–5. I.! II.! III.!

Var. *major* Boiss. with inner glumes of sterile spikelets ciliate on both sides, appears common. I. Rosia! III.!

H. maritimum With. Dry sandy and clayey spots; very common, often far inland; 5–6. I. Grassy rocks, *D.* II.! III.!

H. bulbosum L. Chiefly by dry watercourses; very common; 5–6. III.!

Ægilops ovata L. Dry grassy and sandy places; very common, except on Rock; 4–6. I. Windmill Hill! Europa Flats! Governor's Cottage! III.!

Æ. triaristata Willd. Similar places; much less common; 5–6. Spikes larger, awns much longer, more erect, those of lower pale very unequal. III. i. Campamento Common! By Lajo below First Pine Wood! ii. About San Bernabe! iii. About Palmones Bridge! Guadacorte! and elsewhere.

Æ. triuncialis L. Similar places; occasional; 5–6. Spikes linear, awns very erect. III. i. Campamento Common! Lower slopes Chair! Almoraima! iii. Aguacorte! Guadacorte! No record for ii., but it doubtless occurs.

Agropyron junceum P. de B. Sandy shores; locally frequent; 6–7. I. Governor's Cottage! North Front Butts! Catalan Bay! Here forms are found with leaves flat, 1½–3 lines broad, or involute, 1–1¼ lines when flattened. They look very different. II.! III. i. Sands near La Tunara! iii. Palmones Sands!

A. elongatum P. de B. Muddy salt marshes; rare; 6–7. A stout, stiff, erect species, with large spikelets. III. iii. Guadarranque Marshes!

†*A. campestre* G. & G. Sandy grassy places; frequent; 6–7. A very glaucous species, like a slender *A. repens*. III. i. and ii.!

[*A. repens* P. de B. is abundant in the province.]

Brachypodium sylvaticum R. & S. Woods and bushy places, chiefly in mountains; frequent; 5–8. III. i. and ii.!

B. ramosum R. & S. var. *phœnicioides* Koch (*B. pinnatum* var. *australe* G. & G.). Bushy and stony places; frequent or common; 5–7. Forms dense mats of barren shoots, sometimes a foot thick and three or four broad. I. Above Alameda! Plentiful on southern slopes! III.!

B. mucronatum Wk. Rough stony slopes; locally common; 5–7. In small tufts, with few or no barren shoots. III. ii. Slopes beyond Waterfall!

B. distachyum P. de B. Grassy places; frequent; 4–6. Annual, not perennial, as the last two. I.! II.! III. i. and ii.!

Var. *pumilum* Wk. is a reduced form with 1–2 spikelets, each 5–10-flowered. I. Catalan Bay!

Var. *multiflorum* Wk. has 4–5 spikelets, each 12–24-flowered. III. i. Campamento Common!

Lolium perenne L. Sandy fields; very common; 4–6. I.! II.! III.!

Var. *tenue* Coss. & Germ. is a slender form, with 3-4-flowered spikelets. II. *K.* III. i. Sand Desert, *D.*, *Salzm.*

L. multiflorum Lamk. (*L. italicum* A. Br.). Grassy and sandy places; occasional? 4–6. Spikelets awned, usually annual. III. i. By upper ford on Lajo! I think in many other places, but have no definite records.

L. rigidum Gaud. (*L. strictum* Presl). Sandy and grassy places; rather frequent; 5–6. Spikes very rigid. I. Catalan Bay! A tall erect form like *L. perenne.* III. i. Almoraima! Pindalista! Alcadeza Crags! iii. Guadacorte! All decumbent forms, with curved subcylindrical spikes.

L. temulentum L. Sandy places and cornfields; locally frequent; 4–6. III. i. Campamento Common! Bonel's Farm! First Venta! Common north of San Roque! ii. Occasional!

Var. *macrochætum* A. Br. is a long-awned form. III. i. By San Roque Bull Ring! &c.

Gaudinia fragilis P. de B. Grassy places; very common; 5–6. A form with glabrous spikelets occurs frequently. III.!

Nardurus tenellus Reichb. Sandy and cultivated fields; rare; 5–6. A slender annual, with unilateral spikes. III. i. San Roque, *Brouss.*

Lepturus incurvatus Trin. Sandy ground; rare? 5–6. Glumes two. III. i. Sea sand near Gibraltar, *Salzm*!

L. filiformis Trin. Similar places; frequent or common; 5–6. Very near last, but spikes straighter, spikelets not longer than internodes, and glumes not longer than spikelets. II.! III.!

L. cylindricus Trin. By paths and in cornfields; rare? 5–6. Glumes solitary. III. i. Gibraltar, *Salzm*! Probably in the neighbourhood. ii. Algeciras, *Rev.*

EQUISETACEÆ.

Equisetum Telmateia Ehrh. Chiefly damp bushy places in woods, but not confined to them; frequent; 2–3. III. i. and ii.!

E. ramosum Schl. Dry sandy places and cornfields; very common; 3–5. I. *Lem.* III.! This is doubtless the species referred to by Kelaart (Fl. p. 187) as *E. hyemale*.

[*E. hyemale* L. Sandy banks; very local, or error; 3–5. III. i. Abundantly by a tributary of the Guadarranque, *K.* Probably the Lajo is meant, where the last species is abundant.]

ISOETEÆ.

†*Isoetes bœtica* Wk. In pools; rare; 6. III. i. Rare in pools at Almoraima, *Wk.*

LYCOPODIEÆ.

Selaginella denticulata Sprg. Rough slopes and rocky places among bushes; very common; 2–4. I.! III. i. and ii.!

FILICES.

Gymnogramma leptophylla Desv. Bushy and stony places; very common; 3–5. I.! III. i. and ii.!

Ceterach officinarum Willd. On rocks, partial to limestone; 11–5. I.! III. i. Alcadeza Crags! Long Stables Ravine!

†*Notochlæna Marantæ* R. Br. Similar places; rare; 4–5. Resembling last, but fronds much larger and bipinnate, glabrous above. III. ii. Algeciras Mountains, *Clem.*

†*N. vellea* R. Br. (*N. lanuginosa* Kaulf.). Similar places; rare; 11–3. Smaller than last, woolly both sides. I. *Lem.*! *Boiss.*, *Née.*

Polypodium vulgare L. Rough rocky places, often on tree trunks; rather locally common; 8–3. I. St. George's Hall! Mediterranean Steps! III. i. Queen of Spain's Chair! Cork Woods! Alcadeza! ii. Common in mountains!

Var. *serratum* Willd. has lobes of frond serrate. I. Mediterranean Steps! III. i. San Roque, *Wk.* ii. Algeciras, *Wk.*

Cheilanthes odora Sw. Under rocks and bushes; rare; 2–5. I. About Michael's! Below Spur Battery! III. i. East Slopes Chair! ii. Waterfall!

†*Polystichum Thelypteris* Roth. Streams and marshes; locally frequent; 7–10. III. i. S. Lorca! Cork Wood Sotos!

P. Filix-mas Roth. Woods; rare; 6–9. III. ii. Cuartel de las Corzas, *P. L.* S. de Palma, *Rev.*, *Clem.*

Cystopteris fragilis Bernh. Shady slopes on mountains; rare; 6–9. III. I. San Roque, *D.* ii. S. de Luna, *P. L.* S. de Palma, *Clem.*

Asplenium Filix-fœmina Roth. Damp places in woods; locally common; 6–8. III. i. Cork Wood Sotos! ii. Mountains!

A. lanceolatum Huds. Dry, but shady rocks; locally common; 4–9. III. i. Summit of Chair! ii. Mountains!

A. Trichomanes L. Similar places; common on the Rock, less so in Spain; 4–9. I.! III. i. Alcadeza Crags! Long Stables! S. Carbonera, *D.* No record for ii. where it certainly should occur.

A. Adiantum-nigrum L., var. *Virgilii* Heufl. Bushy and rocky places, chiefly in woods; frequent; 4–9. Only the variety is recorded, which differs from type in narrower, more spreading, more deeply incised segments, and much longer linear sori, but I think type is common. I. *K.*, *D.* I have no note of having seen it on the Rock, but think it is an accidental omission. III. i. Cork Woods! ii. Plentiful in mountains! Carnero Hills!

Scolopendrium Hemionitis Cav. Damp caves; very local; 2–5. I. Michael's Cave, *Clem.*, *K.*, *D.* In a cave on east slopes! Below Governor's Cottage, *K.*

Blechnum spicant Roth. Damp rocky places in woods; local; 6-8. III. ii. In and about Waterfall Valley, and a valley north of it!

Pteris aquilina L. Dry sandy places; very common, except on the Rock; 7–9. I. A starved plant or two growing through the concrete of a water chute just beyond the Mount! III.!

Adiantum Capillus-Veneris L. Damp rocks and by watercourses; frequent in Spain, rather rare on the Rock; 6–7. I. Lower Union Gallery! Cave above North Front! Caves on eastern shore, herb. *Balestrino*! Below Mediterranean tunnels! The Rock form has much larger fronds than that from the country round. III. i. and ii. Scattered over these subdistricts!

Davallia canariensis Sw. On tree trunks and rocks; locally very common; 3-9. [I. *K.*, but obviously in error.] III. i. Cork Woods! ii. Mountains!

Osmunda regalis L. By streams; locally common; 5–9. III. i. Soto Gordo! Almoraima Soto! ii. Waterfall and other valleys!

Ophioglossum lusitanicum L. Sea sand; rare; 1–3. III. ii. Algeciras, *Clem.*

APPENDIX

Additional Species and Varieties.

P. 5. Last line but three should read "*Hesperis matronalis* Lam. var. *laciniata* Boiss. (*H. laciniata* All.). Rocky places; rare; 4–5. I. *Lem.*!"

P. 28. *Medicago obscura.* Add "*f. muricata* Urb., a spiny-fruited form, is reported by Colmeiro from III. ii. Algeciras."

P. 31. After *T. lappaceum* insert "*T. carteiense* de Coincy in Journ. de Bot. xiii. p. 163 is recorded by its author as a new species from the Carteian Hills. I do not know it, but it seems near *T. lappaceum.*"

P. 55. After *Anthemis maritima* insert "*Ormenis nobilis* J. Gay. Sandy heaths; rare; 5–9. Resembles next, but perennial. III. i. Near Gibraltar, *Clem.*"

P. 57. Before *Phagnalon saxatile* insert "*Phagnalon sordidum* DC. Rocky places; rare; 4–6. Known from next by adpressed phyllaries. I.? *Lag.* III. ii. Algeciras, *Née.*"

P. 63. After *Hyoseris radiata* and details insert "var. *elongata* Huet de Pav. Achenes with an inner pappus of 2–3 setæ, the marginal winged. I. Fissures of Rock, *Wk.* III. i. Walls of San Roque, *Wk.*"

P. 66. After *Crepis corymbosa* var. *bætica* insert:—

"*Andryala ragusina* L. Dry bushy hills; rare; 5-7. III. i. Near San Roque, *Boiss.* ex *Colm.*

Var. *minor* Lge. III. i. With the type, *Brouss.* ex *Colm.*"

P. 77. Add "[*Chænorrhinum origanifolium* L. is recorded by Willkomm in Bot. Zeit. 1845, p. 742, as found by him on the Rock, but he enters it from N. Spain only in Prodr. Fl. Hisp.]"

P. 79. After line 17 add "*Pedicularis lusitanica* Hoffm. & Link. Damp spots in bushes and by watercourses; occasional; 3–5. III. i. Queen of Spain's Chair! ii. Mountains! iii. Palmones, *Rev.*

P. 80. Before *Orobanche minor* insert "*O. variegata* Wallr. III. i. Top of Chair! Not previously recorded for Spain." *

P. 80. Before *O. Picridis* insert "*O. Hænseleri* Reut. var. *deludens*,* var. nov. Filamentis paulo supra basim insertis, corollæ lobis copiose glanduloso-pilosis, acriter et longius dentatis. Beck MS. III. ii. Waterfall (my 370)!"

P. 80. Before *O. minor* insert "*O. Hederæ* Duby. III. ii. Near Almoraima!"

---

* The determinations of some of my Orobanches were received from Prof. Beck too late for insertion in their place.

P. 84. Add "[*Phlomis tuberosa*, reported by Boissier (Voy. p. 70) from near the Galleries on the Rock, is probably meant for *Nepeta tuberosa*, which occurs there.]"

CORRECTIONS.

P. 1. *Nigella damascena.* Delete "?" after I. and under II., after K. add "*Rev.*" and delete "probably same station." Debeaux's citation is quite misleading.

P. 5, line 1. For "smaller" read "larger."

P. 22. *Ruta bracteosa.* Remove "?" after I. Erase remarks after *K.* and add "*Boiss.*"

P. 26. Erase II., and for "Neutral Ground" read "North Front."

P. 34. *Lotus angustissimus.* Add "?" Delete "Young examples—here," and substitute "Probably the next has been mistaken for it." Delete "*Boiss.*" who only records it from "between San Roque and Estepona," probably beyond our limits. Debeaux's citation is, as in many cases, misleading. He may have seen a specimen of Boissier's from Algeciras, but I have no confirmation.

NEW STATIONS.

With the exception of the first named, and of the Orobanches, only those previously unrecorded for their districts are given:—*Delphinium Staphisagria.* I. *Hurst!* *Fumaria macrosepala.* III. ii. *B. & R.* *Cistus albidus.* III. ii. *Lag.* *Tuberaria echioides.* III. iii. *Rev.* *Drosophyllum lusitanicum.* III. iii. *Rev.* *Silene littorea.* III. iii. *Fritze, Winkl.* *Arenaria emarginata.* III. iii.! *Cerastium Boissieri.* III. ii. *Von Martius.* *Spergula arvensis* var. *glutinosa.* I. *Lem.* *Lavatera trimestris.* I. *Boiss., K.* *Ononis pubescens.* III.! *Lathyrus sativus.* I. *K.* *Myrtus communis.* I. *Tournef., Ayala.* *Lythrum Græfferi.* I. *K.* *Bupleurum gibraltaricum.* III. ii. *Vahl.* *Helminthia comosa.* I. *K.!* *Andryala arenaria.* I. *Boiss., Wk.* *Jasione montana* (type). III. i. *Boiss.* *Jasminum fruticans.* III. i. *Schott.* *Calystegia Soldanella.* I. *Ayala.* *Echium italicum.* III. i. Navarro, *Pourr.* *Symphytum tuberosum.* III. i. *Von Martius.* *Linaria viscosa.* III. iii. *Rev.*

Orobanche fœtida f. *pusilla* Beck. I. Above Willis's! III. ii. Hills near San Bernabe! *O. sanguinea* Presl. I. Above Willis's! Stigmas yellow in my specimens; Beck describes them as red. *O. Picridis* F. Schultz. III. ii. Palmones Playazo! "*ad minorem* transiens," *Beck.* Palmones Pinar! Var. *Carotæ*, Beck. I. Levant! *O. minor* Sutt. I. Ince's Farm! Above Devil's Gap!

Plantago Lœflingii. III. i. *Von Martius.*

DOUBTFUL STATIONS.

There is no satisfactory evidence that their collectors intended to specify the Rock, as distinct from the neighbourhood, for the following, which are therefore doubtful records for I.:—*Malcolmia lacera.* *Linum gallicum.* *Astragalus Epiglottis.* *Ornithopus* *roseus* var. *isthmocarpus*. *Lathyrus angulatus*. *Daucus crinitus*. *Galium divaricatum*. *Kentrophyllum bæticum*. *Campanula dichotoma*. *Lithospermum fruticosum*. *Linaria cirrhosa*. *L. triphylla*. *Lafuentea rotundifolia*.

DOUBTFUL NAMES.

The following names are doubtful. Where "I." is added, the doubt is as to the correct identification of the species for the Rock, though they may exist elsewhere:—*Erodium Jacquinianum* and var. *bipinnatum*. *E. Salzmanni*. *Ulex aphyllus*. *Ononis diffusa* I. Governor's Cottage. *O. Natrix* var. *media* I. *Medicago turbinata* var. *aculeata* I. *M. coronata*. *Fœniculum officinale* I. *Artemisia pontica*. *Senecio leucanthemifolius*. *Cynara Cardunculus*. *Thrincia maroccana* I. *Andryala laxiflora*. *Erythræa Centaurium* I. *Solanum villosum* I.

ALTERATIONS OF STATUS.

Remove † from *Velezia rigida* and add to *Opoponax Chironium*.

Remove [ ] from district cited or from the whole species if no district is here indicated. *Retama monosperma* I. (Several old records exist.) *Ridolfia segetum* I. (Doubtless a former weed of cultivation.) *Echium italicum*. *Symphytum tuberosum*. *Plantago Lœflingii* (except I.).

Add [ ] to *Senecio petræus* and to district I. for the following:—*Brassica fruticulosa* (erroneous record). *Anthemis arvensis* (casual). *Senecio petræus*, *Carduus nigrescens* and *Helminthia echioides* (wrong determinations). *Anarrhinum bellidifolium*. (Von Martius does not record this species as stated by Kelaart, but he does record *A. tenellus*, doubtless in error for *Chænarrhinum villosum*.)

Add * to *Solanum sodomæum*. *Amaranthus chlorostachys*. *Chenopodium ambrosioides*.

DELETIONS.

Silene cerastioides (record for I., probably not the Rock). *Genista Hænseleri* (record for I., Kelaart did not record it). *Ononis campestris* (record for I., Talbot's records are worthless). *Asperula hirsuta*, and *Coleostephus Myconis* (records for I., Kelaart did not record them). *Andryala arenaria* (citation of Boissier for II., he records it "on the Rock"). *Nepeta reticulata* (certainly an error).

INDEX OF GENERA.

Italics are used for synonyms; those referred to another genus are not mentioned in the text.

PAGE
Acacia 39
Acanthus 86
Aceras 101
Achillea 55
Achyranthes 89
Adenocarpus 25
Adiantum 124
Adonis 3
Ægilops 121
Æluropus 118
Ætheorrhiza 66
Agave 103
Agrimonia 40
Agropyrum 121
Agrostis 113
Aira 115
Airopsis 115
Ajuga 85
Alchemilla 40
Alisma 98
Allium 106
Alnus 97
Aloe 105
Alsine 16
Alternanthera 89
Althæa 19
Amaranthus 88, 127
Ammi 45
Ammophila 113
Amygdalus 40
Anacyclus 55
Anagallis 86
Anagyris 23
Anarrhinum 76, 127
Anchusa 72
Andropogon 112
Andryala 66, 127
Anemone 3
Anethum 47
Anthemis 54, 127
Anthoxanthum 111
Anthyllis 32
Antinoria 115
Antirrhinum 76
Apium 46

PAGE
Arabis 6
Arbutus 68
Arenaria 16, 18, 126
Arisarum 99
Aristida 40
Aristolochia 93
Armeria 87
Arrhenatherum 116
Artemisia 56, 127
Arthrocnemum 89
Arum 99
Arundo 113
Asparagus 104
Asperula 50, 127
Asphodelus 105
Asplenium 123
Aster 54
Asteriscus 54
Asterolinum 86
Asterothrix 86
Astragalus 34, 126
Astrocarpus 12
Atractylis 59
Atriplex 89
Atropis 117
Avena 116

Ballota 84
Barkhausia 66
Bartsia 79
Bellis 53
Beta 90
Betonica 84
Bifora 49
Biscutella 7
Biserrula 35
Blechnum 124
Bonjeania 33
Borago 73
Bourgæa 60
Brachypodium 122
Brachytropis 11
Brassica 6, 127
Briza 118
Bromus 120, 121

PAGE
Bryonia 42
Bunias = Succowia 6
Buphthalmum = Asteriscus 54
Bupleurum 46, 126

Cachrys = Hippomarathrum 49
Cakile 8
Calamintha 82
Calendula 58
Callitriche 95
Calluna 69
Calycotome 24
Calystegia 72, 126
Campanula 68, 127
Capnophyllum 49
Capparis 8
Capsella 8
Cardamine 6
Carduncellus 59
Carduus 60, 127
Carex 110
Carlina 59
Carregnoa 103
Catalpa 71
Catapodium = Scleropoa 118
Caucalis 48
Celtis 96
Centaurea 61
Centranthus 52
Centunculus 86
Cephalanthera 101
Cephalaria 52
Cerastium 17, 126
Ceratonia 39
Cercis 39
Cerinthe 72
Cestrum 75
Ceterach 123
Chænarrhinum 77, 125
Chætonychia 43
Chæturus 114
Chamærops 99

PAGE
Cheilanthes 123
Chenopodium 90, 127
Chlora 70
Chrysanthemum 56
Chrysopogon 112
Cicendia 70
Cichorium 62
Cineraria = Senecio 57
Cirsium 60
Cistus 8, 126
Cladanthus 55
Clematis 1
Cleonia 85
Colchicum 107
Coleostephus... 56, 127
Colocasia 99
Conium 49
Conopodium 45
Convolvulus 71
Conyza 54
Corbularia 103
Coriandrum 49
Coriaria 22
Coridothymus ... 82
Coris 86
Cornicina 32
Coronilla 35
Corrigiola 43
Corynephorus...... 115
Cotyledon = Umbilicus 43
Crambe 7
Cratægus 40
Crepis 66
Crithmum 47
Crocus 102
Crozophora 93
Crucianella......... 50
Crupina 61
Crypsis 112
Cuscuta 72
Cutandia 118
Cydonia 41
Cymbopogon 112
Cynara 60, 127
Cynoglossum 74
Cynodon 112
Cynosurus 119
Cyperus 109
Cystopteris 123
Cytinus 97
Cytisus 23

Dactylis 118
Danthonia 119
Daphne 92

PAGE
Datura 75
Daucus......... 48, 127
Davallia 124
Delphinium ... 1, 126
Deschampsia 115
Desmazeria 118
Dianthus............ 12
Digitalis 78
Digitaria 112
Diotis 55
Diplotaxis 7
Dipsacus 52
Dolichos 39
Dorycnium = Bonjeania 33
Dorycnopsis 33
Drosophyllum 11, 126

Ecbalion 42
Echinochloa 112
Echinops............ 62
Echium 73, 126
Elæoselinum 48
Eleocharis 109
Emex 90
Endymion 105
Ephedra 97
Epilobium 42
Epipactis 101
Equisetum 122
Erica 68
Eriobotrya 41
Erodium 21, 127
Erucastrum 7
Eryngium 45
Erythræa...... 70, 127
Erythrina 39
Eudyanthe 13
Eufragia 79
Eupatorium 53
Euphorbia 93
Euxolus = Amaranthus 88
Evax 57

Fedia 52
Ferula 49
Festuca 119
Ficaria 3
Ficus 96
Filago 56
Fœniculum ... 47, 127
Fragaria 40
Frankenia 11
Fraxinus 69
Fritillaria 104
Fuirena 110

PAGE
Fumana 10
Fumaria......... 4, 126

Galactites 60
Galega 34
Galium......... 51, 127
Gastridium 114
Gaudinia 122
Genista......... 24, 127
Geranium 20
Geropogon 64
Gladiolus 101
Glaucium 4
Gleditschia 39
Glyceria 117
Gnaphalium 56
Gomphocarpus ... 70
Gymnogramma ... 123

Halimium 9
Halogeton 89
Hedera 49
Hedypnois 62
Hedysarum 36
Helianthemum 10, 9
Helichrysum 56
Heleochloa 112
Heliotropium 72
Helminthia ... 64, 127
Helosciadium 46
Herniaria 43
Hesperis......... 5, 125
Hippocrepis 35
Hippomarathrum 49
Holcus 117
Hordeum 121
Hymenostemma = Prolongoa 55
Hyoscyamus 75
Hyoseris 63, 125
Hypericum 20
Hypochœris 64

Iberis 7
Ilex 23
Illecebrum 43
Imperata........... 112
Inula 54
Iris 101
Isnardia 42
Isoetes............... 123

Jasione......... 67, 126
Jasminum ... 69, 126
Juncus............... 107
Juniperus 97

PAGE
Kentrophyllum 59, 127
Kochia 89
Kœleria 117
Kohlrauschia 12
Koniga=Lobularia 8
Kundmannia 47

Lactuca 65
Lafuentea 78, 127
Lagurus 114
Lamarckia 119
Lamium 83
Lathyrus 38, 127
Laurentia 67
Laurus 92
Lavandula 81
Lavatera 19, 126
Leersia 111
Lemna 98
Leontodon 64
Lepidium 8
Lepigonum 17
Lepturus 122
Leucoium 102
Leuzea 61
Limodorum 101
Linaria 77, 126
Linum 18, 126
Lithospermum 73, 127
Lobelia 67
Lobularia 8
Lœflingia 43
Lolium 122
Lonicera 50
Lotus 33, 126
Lupinus 25
Luzula 108
Lychnis (see Melandryum and Eudyanthe) 13
Lycium 75
Lycopus 81
Lysimachia 86
Lythrum 41, 126

Macrochloa 114
Magydaris 47
Malcolmia 5, 126
Malva 19
Mandragora 75
Marrubium 84
Matricaria 55
Matthiola 5
Medicago 28, 125
Melandryum 13
Melia 20
Melica 118

PAGE
Melilotus 29
Melissa 82
Mentha 81
Mercurialis 93
Mesembryanthemum 44
Microcala = Cicendia 70
Microlonchus 61
Micromeria 82
Mirabilis 88
Mœhringia 16
Mœnchia 17
Molineria 115
Molinia 119
Momordica=Ecballion 42
Morus 96
Muscari 105
Myosotis 74
Myriophyllum 42
Myrtus 41, 126

Narcissus 103
Nardurus 122
Nasturtium 6
Neotinea 101
Neottia = Spiranthes 101
Nepeta 83, 127
Nerium 70
Nicotiana 75
Nigella 1, 126
Nothoscordum 107
Notobasis 60
Notochlæna 123

Obione 89
Odontites 79
Œnanthe 47
Œnothera 42
Olea 69
Omphalodes 74
Onobrychis 36
Ononis 25, 127
Onopordon 59
Ophioglossum 123
Ophrys 100
Opoponax 49, 127
Opuntia 45
Orchis 99
Origanum 81
Orlaya 48
Ormenis 55, 125
Ornithogalum 104
Ornithopus 36, 126
Orobanche 79, 125, 126

PAGE
Osmunda 124
Osyris 92
Otospermum = Matricaria 55
Oxalis 21

Pallenis = Asteriscus 54
Pancratium 103
Panicum 112
Papaver 4
Parietaria 95
Paronychia 43
Paspalum 112
Passerina = Thymelæa 92
Pedicularis 125
Peplis 41
Perideræa 54
Peristylus=Orchis 100
Petroselinum 46
Phaca 35
Phagnalon 56, 125
Phalaris 111
Phelipæa 80
Phillyrea 69
Phleum 111
Phlomis 84, 126
Phragmites 113
Physanthyllis 32
Phytolacca 90
Picridium 65
Picris 64
Pimpinella 46
Pinardia 56
Pinguicula 86
Pinus 97
Piptatherum 114
Pistacia 23
Pistorinia 44
Pisum 39
Plantago 87, 126, 127
Poa 117
Podospermum 64
Polycarpon 43
Polygala 11
Polygonum 91
Polypodium 123
Polypogon 114
Polystichum 123
Populus 97
Portulaca 43
Posidonia 98
Potamogeton 98
Potentilla 40
Poterium 40
Prasium 85

PAGE
Prolongoa 55
Prunella 85
Prunus.............. 41
Psamma 113
Psoralea 34
Pteris 124
Pterocephalus ... 53
Pterospartum 24
Pulicaria 54
Punica 41
Pupalia 89
Pycnocomon 53
Pycreus 109
Pyrus 41

Quercus 96

Radiola 18
Ranunculus 1
Raphanus 7
Rapistrum 7
Reseda.............. 11
Retama 23, 127
Rhagadiolus 63
Rhamnus 22
Rhododendron ... 68
Ricinus 93
Ridolfia 46, 127
Rœmeria 4
Romulea 102
Rosa................. 40
Rosmarinus 82
Rottboellia=Scleropoa 118
Roubieva............ 90
Rubia 50
Rubus 39
Rumex............... 90
Ruppia.............. 98
Ruscus............... 103
Ruta 22, 126
Rynchospora 110

Sagina 16
Salicornia 89
Salix 97
Salsola.............. 89
Salvia 82
Sambucus 50
Samolus 87
Sanicula 45
Saponaria 16
Sarothamnus 23
Satureia 82
Saxifraga............ 45
Scabiosa 53
Scandix 45

PAGE
Schinus 23
Schismus............ 117
Schœnus 109
Scilla 105
Scirpus 109
Sclerochloa......... 118
Scleropoa 118
Scolopendrium ... 124
Scolymus 62
Scorpiurus 35
Scorzonera 64
Scrophularia 76
Sedum 44
Selaginella 123
Sempervivum...... 44
Senebiera 8
Senecio 57, 127
Serapias 99
Seriola 65
Serrafalcus 120
Serratula............ 61
Setaria 112
Sherardia 50
Sibthorpia 78
Sideritis 84
Silene 13, 127
Silybum 60
Simethis 105
Sinapis.............. 6
Sisymbrium 5
Sium=Kundmannia 47
Smilax 103
Smyrnium 49
Solanum 74, 127
Sonchus 65
Sorghum 112
Sparganium 99
Spartina 112
Spartium......... 23, 24
Spergula......... 17, 126
Spergularia......... 17
Spiræa 40
Spiranthes 101
Sporobolus 114
Stachys 84
Statice 87
Stellaria 17
Stipa 114
Suæda 89
Succowia............ 6
Symphytum ... 74, 127

Tamarix 42
Tamus 103
Tapeinanthes=Carregnoa 103

PAGE
Taraxacum 65
Teesdalea 8
Tetragonolobus ... 33
Teucrium 85
Thapsia 48
Theligonum 95
Thesium 92
Thrincia......... 63, 127
Thymelæa 92
Thymus 81
Tolpis 62
Torilis 47
Trachelium......... 68
Tragopogon......... 64
Tragus 112
Tribulus 22
Trichonema=Romulea.................. 102
Trifolium 30, 125
Triglochin 98
Triodia=Danthonia 118
Trisetum 116
Trixago 79
Tuberaria 9, 126
Tulipa 104
Tunica 12
Typha 99

Ulex 24, 127
Ulmus 96
Umbilicus 43
Urginea 105
Uropetalum 105
Urospermum 64
Urtica 96

Vaillantia 51
Valeriana 51
Valerianella 52
Velezia 13, 127
Verbascum 76
Verbena 86
Veronica 78
Viburnum 50
Vicia 36
Vinca 70
Viola 11
Vitex 86
Vitis.................. 20
Vulpia 119

Xanthium 67

Zannichellia 98
Zostera............... 98

New York Botanical Garden Library
3 5185 00265 032